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THE MECHANISM OF DAUGHTER CYST FORMATION IN HYDATID DISEASE.

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Introduction.

IN a previous paper on the ætiology of daughter cyst formation[1] I emphasized the essential protective nature of this development and concluded that the phenomenon was a reaction on the part of the parasite when its vitality and its power of producing scolices were menaced by some complication. This conclusion alone explained all the observed clinical and pathological facts. The present paper, based upon observations and experiments made during the last two years, attempts to explain the mechanism of daughter cyst production and to correlate the diverse views advanced by various authorities.

In a typical case of endogenous daughter cyst formation many small cysts of various sizes are found enclosed in an adventitious capsule which is often irregularly pouched and lined with shaggy inspissated *débris*. The daughter cysts are often packed together, moulded by mutual pressure and embedded in hyaline *débris*. They are replicas of the original cyst except that they have no separate supporting adventitia.

The laminated membrane of the original mother cyst is rarely, if ever, found completely attached to the adventitia, but is usually lying free either intact or disintegrated amongst the daughter cysts. The fluid of the original cyst has often disappeared and the fluid which is sometimes present around the daughter cyst, is probably derived from the rupture of some of them.

The Origin of Daughter Cysts.

From the Original Germinal Cells.

The original cells of the germinal layer have three main functions. They lay down a protective laminated hyaline coat which also serves as a support, they elaborate a specific fluid which acts as a buffer and as a nutritive medium, and they give rise to brood capsules and scolices. It seems logical to infer that they retain these powers while the cyst is still alive and growing and may therefore give rise to the formation of daughter cysts. Nauyn[2] first mentioned this method of formation, but his

description is probably inaccurate. According to this observer the original cyst loses some of its fluid and undergoes partial collapse, so that surfaces formerly separated come in contact and become adherent with the formation of small pouches lined with germinal membrane. These pouches become constricted at their attachments and serve as the starting point of new cysts. Dévé[3] believes that the germinal cells can occasionally give rise to daughter cysts by a local cellular accumulation which becomes vesicular, covered with hyaline material and finally detached. This process resembles the mechanism of brood capsule production, laminated membrane being laid down before scolices are developed. Only rarely does one find one or two isolated daughter cysts inside an apparently healthy unilocular cyst in which normal brood capsule production is proceeding. I have seen only one example in which a single daughter cyst arose in a cyst with an intact germinal membrane and regard it as an aberrant development. Many writers including Leuchart[4] and Rasmussen[5] believed that brood capsules alone could give rise to daughter cysts. Nauyn objected to this view and stated that if this were so, all cases of daughter cyst formation should show some evidence of previous scolex production. Helm,[6] however, was able to show that daughter cyst formation could occur without the intervention of the brood capsule stage. I have seen small primary subcutaneous cysts and recurrent cysts in a postoperative case containing many small daughter cysts in which no evidence of scolices or hooklets could be detected. The same fact has been observed in cases of omental cysts.

The following case, for a record of which I am indebted to Mr. V. Hurley, illustrates the development of daughter cysts from the germinal membrane in a pulmonary cyst.

R.Mc., a farmer, aged forty-two years, six months before being seen in consultation had a sudden attack of coughing accompanied by a brisk hæmoptysis. He was treated as though suffering from early phthisis, because a small area of dulness was discovered in the upper lobe of the left lung. Three months later he had another attack of hæmoptysis and X ray examination at that time revealed a rounded shadow which was regarded as hydatid cyst. Nine weeks later he felt something go in his chest. Immediately following this his mouth and nose were filled by a sudden rush of saltish fluid which was coughed up accompanied by a little blood. There were no signs of "grape skins." X ray examination revealed an opaque shadow, the lower third of which was caused by fluid. The patient had no symptoms except a dry ineffective cough. The Casoni and complement deviation tests both yielded positive results. At operation a partially collapsed hydatid cyst of the upper lobe of the left lung was removed with most of its contained fluid. On examination a small nipple shaped projection showed the site of rupture and protrusion into a bronchus. There were some daughter cysts present. Figure I. shows the inner wall of this collapsed cyst. There were several small detached daughter cysts and some apparently solid white masses of hyaline material attached to an area of the collapsed cyst. On section the latter had a nucleated centre around which laminated hyaline material had been laid down. These were regarded as abortive attempts to form daughter cysts. No doubt had conditions been more favourable, fluid would have been formed and less hyaline material deposited. The fluid from the cyst was cloudy and contained cellular *débris*, hyaline shreds, hooklets and many dead and disintegrating scolices. No intact brood capsules were found. The daughter cysts were examined microscopically and in none were hooklets discovered.

There seems to be no doubt from the site and method of their growth that the daughter cysts were developed from the cells of the mother germinal membrane and not from brood capsules or scolices.

The sequence of events appears to be as follows. The first complication to the cyst was either a slight leak which passed unnoticed during the hæmoptysis, or the entry of blood into the pericystic space, causing alteration of the intracystic pressure with separation of the germinal membrane. The parasite reacted with the formation of daughter cysts which were derived from the cells of the germinal membrane, the brood capsules and scolices dying. Judging by the recurrent hæmoptyses, probably at no time during the six months were conditions stable for the parasite. As a result the protective covering of most of the young daughter cysts became disproportionately thick.

I have frequently noted granddaughter cyst formation in daughter cysts in which the development has taken place from the cells of the germinal layer (see Figure II.).

When daughter cysts arise from the germinal membrane, the mechanism appears to be as follows. Owing to some abnormal condition the germinal membrane becomes detached from the laminated layer and floats freely in the fluid of the cyst. The delicate germinal layer is but lightly adherent to the laminated layer and separates very readily even after slight trauma or alteration of intracystic pressure. In this state development and growth of scolices is impossible and islets of germinal cells may lay down fresh protective hyaline layers and produce fluid, forming small daughter cysts. An indication of the activity of the germinal cells and of the stimulus towards reproduction is given by the frequency with which brood capsules and scolices are found in these daughter cysts even when extremely small, for example from one to four millimetres in diameter. There is an active proliferation in the cellular islets, not a passive pouching or sacculation with fusion of contiguous layers. This derivation of daughter cysts from the original germinal cells is a logical outcome of their persistence and activity and I believe it to be the most common method.

From Brood Capsules.

Brood capsules are derived from the germinal layers of the original cyst and are formed for the special purpose of protecting the developing scolices.[7] The cells are arranged in a single layer and have the same power of producing hyaline material and fluid as the original cells. It is, therefore, reasonable to conclude that they can give rise to daughter cysts. Rasmussen,[5] Leuchart[4] and Nauyn[2] all strongly supported this view, while the firstnamed stated that all daughter cysts are formed in this way. Nauyn's description of the metamorphosis is as follows: The first step is a laying

down of hyaline material around the brood capsule; the nucleated layer disappears and is replaced by a new one derived from disintegration of the contained scolices. The latter break up gradually and some of the cells spread out over the inside of the cuticle of the brood capsule, the hooklets remaining for some time and giving a clue to the mode of origin. Rasmussen disagreed with this view and did not believe that the nucleated layer of the new cyst was derived from disintegration of the scolices. The description appears unnecessarily complicated and it is illogical to suppose that active undifferentiated cells which lay down hyaline material, should suddenly disappear and be replaced by cells derived from disintegration of such differentiated structures as scolices.

Rasmussen made most of his observations on material derived from human sources and he stated that the change could often be observed inside daughter cysts. According to him the brood capsule lays down an outer hyaline layer and becomes larger and more rigid. In the scolices fat globules appear, the suckers disappear and the parenchyma becomes disintegrated, the whole being finally represented by *débris*, calcareous particles and hooklets. These eventually disappear with the growth of the cyst which becomes in all respects typical. Dévé[3] also believes that this change can occur, but he regards it as relatively rare. I have observed the metamorphosis of brood capsules exactly as Rasmussen describes and agree with him in all essential details. It can often be observed in daughter cysts and particularly in hepatic cysts in which some fresh complication, such as a second biliary contamination or mild infection, has caused upset of normal conditions and reaction on the part of the surviving parasitic cells. Figure IV. is a photograph of daughter cysts derived in this way. The specimen was obtained from a daughter cyst in an hepatic hydatid contaminated with bile. Many of the daughter cysts were dead and disintegrated, no living scolices were found, but in some of the daughter cysts small granddaughter cysts, as depicted in the photograph, were found lying amongst dead and disintegrating scolices.

Whether all brood capsules have this power or whether it is still confined to comparatively young specimens which are still growing and giving rise to new scolex buds, is problematical. It is conceivable that in old brood capsules, that is those containing twenty or more scolices, the activity of the nucleated layer may be exhausted and thus it may not be able to form daughter cysts. I have attempted by direct experiment to throw some light on this phenomenon. Hydatid sand, a mixture of intact brood capsules and scolices set free by rupture of others, was obtained from cysts of the sheep. This was washed in fresh hydatid fluid and examined microscopically for viability, as evidenced by active movement of the scolices on being warmed. By the use of a hand lens and a fine pipette the brood capsules were carefully separated from free scolices and were injected in 0·5 cubic centimetre lots suspended in saline solution into rabbits. The subcutaneous, intramuscular, intraperitoneal and intracarotid routes were chosen. The animals were submitted to autopsy from five to six months later and with the exception of the intracarotid injections, positive results were obtained by all methods. The cysts then obtained were typical hydatid cysts measuring up to one centimetre in diameter, some being simple and others loculated. Figure V. is a section of the abdominal wall of a rabbit showing a collection of cysts derived from injected brood capsules.

In the experiments in which brood capsules were injected into the carotid artery, death of the animals took place within three days with signs of cerebral embolism. On section many small cortical hæmorrhages, due to blocking of small vessels by the relatively large brood capsules which vary in diameter from 500 μ to 1,800 μ, were discovered. There is an obvious objection which may be held to nullify the results of these experiments. As will be discussed later, it has been shown that injection of scolices alone can give rise to daughter cysts and it is possible that this happened in the above experiments. An attempt was made by means of serial sections of the resultant cysts to ascertain whether the number of residual hooklets could be counted in order to get an indication of the origin of the cyst. This was found to be impracticable. In one animal in which an intraperitoneal injection of brood capsules was made, many small subperitoneal nodules were found in the liver. On section these were found to be mainly fibrous, but hyaline material was present and some gave evidence of a composite nature. The appearance strongly suggested that an attempt had been made by the cells of the brood capsule to form a cyst, the scolices becoming degenerated. At a later stage the small cyst was overcome by the cellular reaction of the host with resulting fibrosis.

Dévé has recorded an injection experiment in which he discovered some months later six small cysts enclosed in a larger one. He regarded this as evidence of daughter cyst production from a brood capsule with cyst production as well from the enclosed scolices. I am convinced from observations on human cases that daughter cysts can develope from brood capsules, that this is a logical outcome of the potential activity of the brood capsule cells and that it is a relatively common method.

Origin from Scolices.

The scolex has a well differentiated structure, having suckers, contractile tissue, well formed hooklets and a hyaline cuticle. In the natural course of events it remains in a resting state until it is swallowed by the proper definitive host when it developes into the adult worm. That the original germinal membrane or the brood capsule both of which are composed of undifferentiated cells, can give rise to daughter cysts appears logical, but that the relatively differentiated scolex can do likewise appears to be contrary to all the accepted laws relating to the development of the cestodes. Yet in 1862 Nauyn first described vesicular changes in the

scolex leading to the formation of a typical cyst. Leuchart himself admitted the possibility of such a change, but it was strenuously denied by Davaine, Moniez, Paltharat[8] and others. Nauyn figured an example in which this change was progressing while the scolex was still inside the brood capsule, the latter obviously becoming ruptured when the young cyst increased in size.

More recently Dévé[9] has carried out many experiments mainly on rabbits and has elucidated many interesting problems. In his first experiments he injected scolices subcutaneously into rabbits and after some weeks found typical small hydatid cysts at the site of injection. Serial sections revealed at one pole of the cysts a small mass of *débris* containing from twenty-six to forty-two hooklets which he regarded as a definite indication of the origin of the cyst from a scolex. He repeated this type of experiment in many different ways with uniformly positive results and found that by intraarterial or intravenous injection of living scolices he could produce hydatid metastases in various organs. He was able in this way to produce cysts in the brain, the hypophysis, the eye and the spinal cord, thus demonstrating the possibility of hydatid embolism. He has also observed vesicular transformation of the scolex in hydatid cysts in animals. According to his experimental observations the metamorphosis takes place as follows. The volume increases, the cells become separated and loosely arranged and the longitudinal muscle cells arrange themselves parallel to the periphery. The cuticle thickens by the formation of well marked concentric laminations. Some of the parenchymal cells form a nucleated layer on the inner aspect of the cuticle, the remainder disappear, while the hooklets remain enclosed in a small mass of *débris* at one spot on the periphery. Later they too disappear. This description follows that of Nauyn closely, but Dévé regards the transformation not as a mere metamorphosis, but as a progressive evolution from one state to another.

From his observations he concludes that in addition to the natural life cycle which obeys the laws of van Beneden, there is a smaller collateral cycle in the intermediate host alone with the peculiarity that it can return to the normal state of the cycle later. In his opinion endogenous daughter cysts most commonly arise from scolices in this way. I have repeated Dévé's experiments on rabbits, using active scolices from cysts of the sheep carefully separated from brood capsules. These were injected intraperitoneally, subcutaneously and intramuscularly and by all methods positive results were obtained. Figure V. shows cysts obtained by intraperitoneal injection.

The small cyst in this figure appeared at the site of injection in the subperitoneal tissues and the larger multiloculated one was found attached to the omentum. The latter was due to the contiguous growth of several small cysts derived from individual scolices. The same results may be obtained by subcutaneous or intramuscular injection in about 70% cases. These cysts vary considerably in size under apparently identical conditions. Figure VI. represents a section through a cyst produced experimentally by subcutaneous injection of scolices. Microscopical examination reveals an intense tissue reaction with considerable local accumulation of granular eosinophile cells. There is also much caseous *débris* which contains remnants of hooklets and cholestrin crystals. "Foreign body" giant cells are common and small nodules of fibrous tissue represent scolices which have been overcome by the tissue reaction. There is no doubt that while some of the scolices undergo transformation into cysts, the great majority become disintegrated or enclosed in fibrous tissue. This may account for the great disproportion between the number of scolices injected and the number of resultant cysts. Dévé, for example, after intracarotid injection of many scolices often discovered only a single resultant cyst and the same fact has been regularly noted in my own experiments. It must be borne in mind that scolices obtained from growing cysts vary greatly in nature. Some are healthy and well developed, others are immature buds with relatively little cellular differentiation, while others are degenerated. The latter are dark in colour, have few calcareous bodies, poorly developed hooklets and suckers and are often small and shrunken. They are common even in healthy cysts and are frequently found separated from the brood capsule.

It seems much more likely that secondary cyst formation proceeds from the relatively undifferentiated scolex buds than from the fully developed scolices. If this be so, it may help to explain the small proportion that survive. The fact that any survive is remarkable and is of great pathological and clinical importance.

It is obvious that the conditions of sterile subcutaneous or intraperitoneal injection are very different from those existing inside a cyst complicated by entry of bile or other substance. In injection experiments the hydatid cells act rather like implanted tissue; some are overcome by the cells of the host, but a few survive, revert back to their original functions and form protective cysts. This phenomenon can happen naturally following puncture, rupture or leakage into a vessel. In the case of contamination of a cyst with bile or other noxious substances it seems that of all the hydatid elements the relatively differentiated scolex is least likely to survive. The whole mechanism of cyst formation and secondary daughter cyst production is undoubtedly protective to insure the development and survival of scolices and it is illogical to suppose that, once this protection has broken down, the scolices can protect themselves by forming fresh cysts.

In observations on cysts obtained from human sources I have never seen any vesicular change in scolices which might lead to daughter cyst formation. The appearance may, however, be closely simulated by hydropic distension of the scolex as the result of osmotic processes. On the other hand, daughter cyst formation from brood capsules in

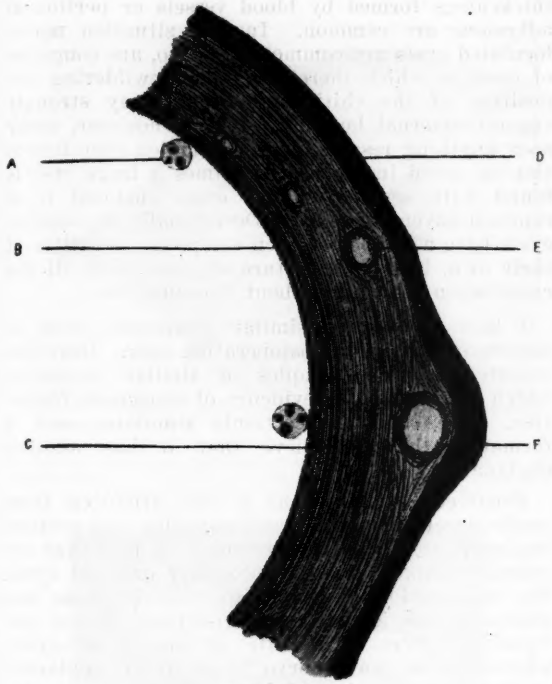

FIGURE VII.
Diagram Showing Accepted Method of Intracuticular Origin of Daughter Cysts (Exogenous Budding). A = Brood capsule; B = intact mother germinal layer; C = laminated layer of mother cyst; D = adventitia of mother cyst; E = small intracuticular cyst making its way out; F = further stage of E.

hepatic cysts in which all the scolices examined were dead or disintegrating, is frequent in my experience. Figure III. illustrates this point very well. In such cases as these if scolices could readily react to the entry of bile and so forth, one would expect to find some scolices at least undergoing transformation into cysts. In view of the above experimental evidence, however, the possibility of endogenous daughter cyst formation from this source must be admitted. If it does occur, it probably does so from the relatively undifferentiated scolex, but under special conditions. Pathological and clinical observations, however, show that implantation of scolices can readily occur under sterile conditions with secondary cyst formation outside the original cyst.

Exogenous Formation of Daughter Cysts.

Many authorities have described another method of daughter cyst formation in which the resultant cysts lie outside the original mother cyst. To distinguish this from the common or endogenous formation it has been called exogenous budding. Leuchart[4] described this method as follows. A small accumulation of granular cells appears between the deep layer of the cuticle. These cells multiply and form a separate cuticle, the new formation increasing in size by the formation of additional layers, becoming vesicular and separating the adjacent strata of the original cyst. In this way a small cyst is formed which gradually approaches the external surface of the parent cyst (Figure VII.). It ultimately makes it way to the exterior where it may remain for some time, but sooner or later it becomes detached and is found enclosed between the adventitia and the parent cyst. Cysts thus formed may succumb to pressure or increase in size as independent cysts. Later they may acquire an adventitia of their own, thus resembling cysts which have arisen from a separate embryo.

Nauyn objected to this view and maintained that this method of daughter cyst production must be due to the activity of original germinal cells which had in some way become included. This certainly is in accord with the views generally held by zoologists as to the relative vital activities of the cuticle and the germinal layer. Certain writers have insisted that endogenous daughter cysts may also have an intracuticular origin and the method is figured in many textbooks. Blanchard, Brumpt, Moniez and many others uphold this view. Dévé insists that the theory of the common origin of endogenous and exogenous cysts is totally wrong and that exogenous cysts alone have an intracuticular origin. Practically all authorities accept the following:

(i.) That daughter cysts may have an intracuticular origin.

(ii.) That these cysts by their growth make their way through the laminated layer of the mother cyst until they burst out under the adventitia. Some authorities state that they can also make their way into the cyst cavity and give rise to endogenous cysts.

(iii.) That in human beings this method is practically confined to secondary hydatid cysts of the omentum and to hydatid cysts of bone.

(iv.) That it is extremely common in the *herbivora*.

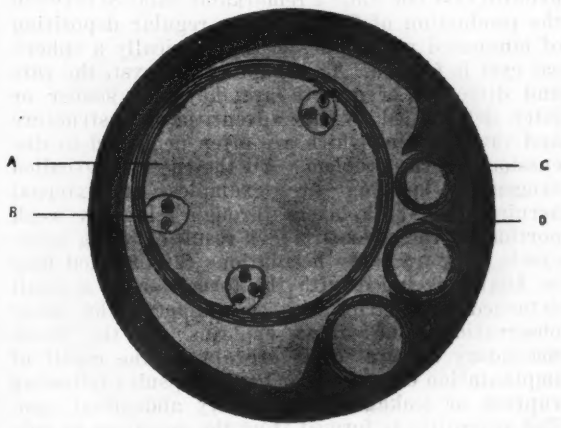

FIGURE VIII.
Diagram to Show one Arrangement of Cysts which Simulates Exogenous Formation (from a recurrent cyst). A = Large cyst with brood capsules; B = brood capsule; C = smaller cyst; D = compound adventitia.

There can be no doubt that the granular inclusions described cannot have an origin direct from the non-nucleated homogeneous hyaline layer. It has been suggested that they are formed from an accidental inclusion of cells between the layers during development. Dévé himself who supports this view, remarks that it is curious that a developmental malformation should furnish the parasite with a means of assuring its survival and propagation. When the earliest stages of development of the cystic stage are considered, it is very difficult to understand how this inclusion can occur. No attempt has been made to explain why developmental anomalies should be more common in bone, in secondary omental hydatids or in animals. There is no doubt that the hypothesis is weak and Dévé, evidently realizing this, has endeavoured to surmount the difficulty by suggesting that an inclusion of germinal cells can take place during growth of the original cyst and that these inclusions, starting near the cavity of the cyst, gradually develope into intracuticular cysts. These make their way out passively and are set free by a gelatinous softening of part of the wall of the mother cyst. As far as I can ascertain, no actual photographic proof of the existence of intracuticular nuclear masses has ever been put forward, although it has been figured many times. I have searched in vain by means of serial sections in the walls of hydatid cysts from many sources and have failed to discover any indisputable evidence of such masses. Occasionally nuclear material enclosed in irregular hyaline processes is seen, but there is always another explanation of the appearance.

The supporters of the hypothesis bring forward little direct evidence and fail to explain many facts. I believe that the view that daughter cysts ever have an intracuticular origin or that exogenous budding, as usually described, ever occurs is founded on incorrect observations and illogical reasoning and hope to show that it is inconsistent with the facts. If one considers the gradual increase in size of a hydatid cyst one finds a remarkable balance between the production of fluid and the regular deposition of laminated membrane, so that typically a spherical cyst is formed. The shape of the cyst, the rate and direction of growth are, however, sooner or later determined by the adventitia, the structure and variations of which are often neglected in discussions on the problem. All the cases of so-called exogenous budding are examples of external herniation of both layers through relatively weak portions of the adventitia as a result of rising intracystic pressure. The herniations thus formed may be finally excluded with the formation of a small detached cyst. This view is supported by many observations and alone explains all the facts. Secondary omental cysts are always the result of implantation of scolices or brood capsules following rupture or leakage of a primary abdominal cyst. The adventitia is formed from the omentum or subperitoneal tissue. It is extremely variable in thickness, areas of sclerosis alternating with areas so thin as to be almost transparent, while there is little or no external supporting tissue. Local thickenings formed by blood vessels or peritoneal adhesions are common. In this situation multiloculated cysts are common. So, too, are congeries of cysts in which there may be a bewildering disposition of the chitin and which may strongly suggest external budding. I have, however, never seen anything resembling the complex cyst formation as noted in bone. Sometimes a large cyst is found with several smaller cysts enclosed in a common adventitious sac. Occasionally the smaller cysts have a partial or even complete adventitia of their own, but the structure suggests that all the cysts began growing at about the same time.

I have also noted similar compound cysts in recurrent cysts in a postoperation scar. Dévé has reported several examples of similar formation which he regarded as evidence of exogenous formation. The condition certainly simulates such a formation, but I believe that it has another explanation.

Recurrent cysts are as a rule produced from cystic development in brood capsules and scolices implanted in the operation wound, so that they are exactly comparable with secondary omental cysts. The explanation of composite cysts in these two classes of case is that cysts arise from several contiguous scolices. The rate of growth of cysts, whether from an embryo[10] or from implanted scolices, is extremely variable even under apparently identical conditions. This is borne out by observations on animals which are the subject of experiment, and by clinical observations on cases of multiple abdominal sowing of brood capsules and scolices. The growth will depend on nutrition which is dependent on osmotic processes through the laminated membrane. It is obvious that if one cyst gets ahead of the others, the surface area of that cyst will be greater than the others in the ratio of the cube of the radii and growth will be more rapid in about the same proportion. As a result inequality in the size of the cysts may be readily produced, one cyst rapidly gaining an ascendancy over the others. A somewhat similar appearance may be produced in subcutaneous or muscle cysts. In these small daughter cysts of various sizes may be found embedded in an irregular manner inside a fibrous adventitia. This formation is due to the rupture of a small mother cyst either by muscular contraction or direct injury and the liberation of pieces of germinal membrane, brood capsules or scolices. The latter may form daughter cysts, some of which may be carried some distance by muscle movement. The original cyst can often be discovered in a degenerated state, but sometimes is overwhelmed by the growth of the daughter cysts. Many samples of this process have been recorded, those of Mainwaring[11] and Cleland[12] being cases in point. The appearance certainly suggests external budding and the name "seed" hydatid which has been given to these cases, is very appropriate.

As cysts increase in size the most important factor, however, is herniation of both layers through relatively thin portions of the adventitia. By constriction at the neck of the pouch and fusion of the

ILLUSTRATIONS TO DR. HAROLD R. DEW'S ARTICLE.

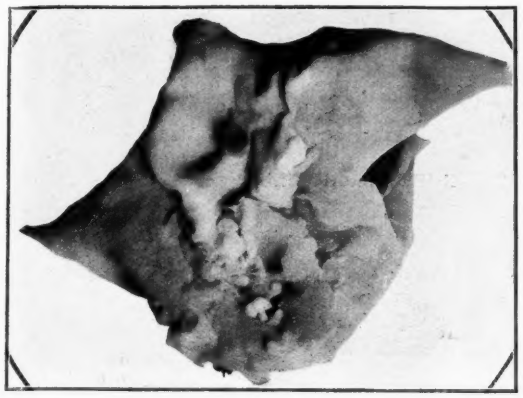

FIGURE I.
Collapsed Hydatid Cyst Removed from the Lung. Note the aggregation of daughter cysts and of spherical semi-solid hyaline masses at one place. Natural size.

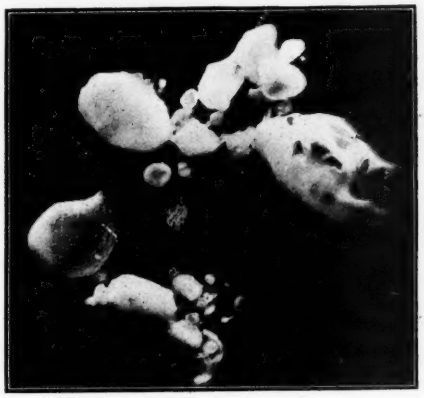

FIGURE II.
Growth of Daughter Cysts from Scattered Islets of Germinal Cells in Germinal Membrane which has become Detached.

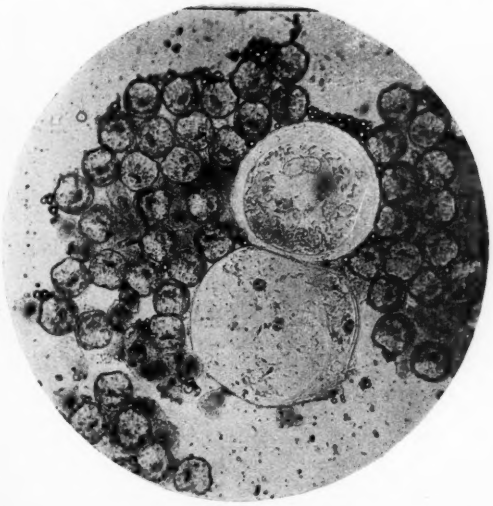

FIGURE III.
Daughter Cysts Developed from Brood Capsules. Note disintegrated scolices and hooklets within these cysts and many dead and degenerating scolices outside. Ocular 2. Objective 3.

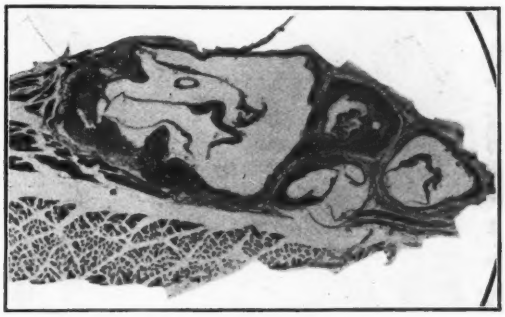

FIGURE IV.
Section of Cysts in Abdominal Wall of Rabbit Obtained by Intramuscular Injection of Brood Capsules.

FIGURE V.
Subperitoneal Cyst and Multilocular Omental Cyst Obtained by Intraperitoneal Injection of Scolices into a Rabbit.

FIGURE VI.
Section of Cyst Resulting from Subcutaneous Injection of Scolices (three months). Note: (i.) Small fibrotic nodule to the right which represents fibrosis around a scolex; (ii.) degree of cellular reaction and formation of a dense adventitia; (iii.) separation of hyaline laminated membrane. Ocular 2. Objective 3.

ILLUSTRATIONS TO DR. HAROLD R. DEW'S ARTICLE.

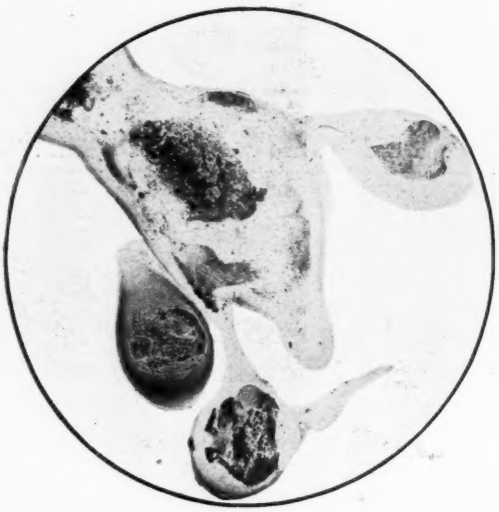

FIGURE IX.

Granddaughter Cyst Formation as a Result of External Pouching of all Layers with Subsequent Closure. From daughter cyst in hepatic cyst. Objective 3. Ocular 1.

FIGURE XI.

Hydatid of Bone: Section Showing Growth of Parasite between Bony Trabeculæ. Note the laminated membrane may be in direct contact with bone, the cellular reaction where active growth is proceeding and the tendency towards cutting off of the process. Ocular 1. Objective 7.

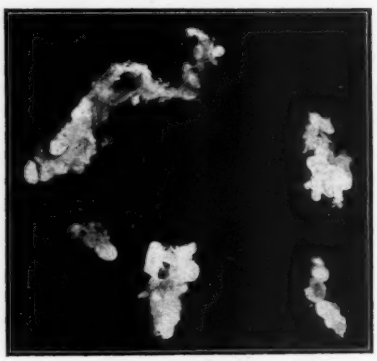

FIGURE X.

Process of Hydatid Cyst Dissected from Decalcified Bone. Specimen shows multiple pouchings along bony canals. These later may become cut off with the formation of small cysts.

FIGURE XII.

A Similar Process to that in Figure XI. Obtained from Hydatid of Bone. Ocular 1. Objective 3.

ILLUSTRATIONS TO DR. H. LEE-BROWN'S ARTICLE.

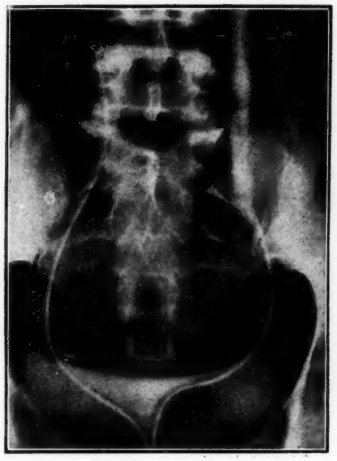

FIGURE I.

Stricture of the Ureter. Note the definite dilatation above site just anterior to the sacro-iliac joint with a return to the normal calibre below.

FIGURE II.

Advanced Uninfected Hydronephrosis.

FIGURE III.

Pyonephrosis of Kidney.

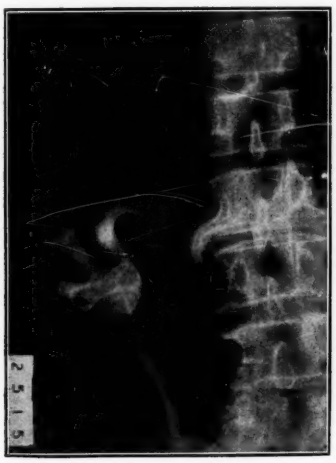

FIGURE IV.

Stones in Kidney: Pyelogram of Five Transparent Kidney Stones. These stones failed to show in an ordinary plate, but following the introduction of bromide they are rendered apparent as areas of deficient density in the pyelogram.

FIGURE V.

Leukoplakia of Kidney Pelvis, Demonstrating Distorted Pelvis and Uneven Filling Defects of this Uncommon Condition. The varying density is due to the rugosity and the greatly thickened leukoplakic ridges in the pyelvic mucosa.

FIGURE VI.

Early Polycystic Kidney Demonstrating the Beginning Attenuation of the Calyces.

ILLUSTRATIONS TO DR. H. LEE-BROWN'S ARTICLE.

FIGURE VII.

Advanced Polycystic Kidneys: Bilateral Pyelogram of Advanced Cystic Disease, Demonstrating Huge Pelves with no Sign of Obstruction. The bilateral condition and nature of the pyelogram clearly distinguishes this from tumour or hydronephrosis.

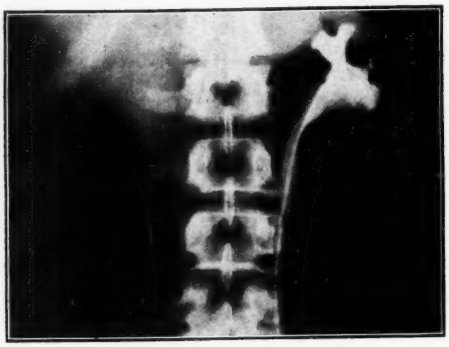

FIGURE VIII.

Tumour of Lower Pole of Kidney. The lower part of the pelvis together with the lowest calyx is completely obliterated by filling defect due to encroachment of tumour.

FIGURE IX.

Tumour of Kidney with the Typical Spider Leg Deformity of the Pelvis.

FIGURE X.

Horse Shoe Kidney with Definite Displacement of the Entire Kidney. Fusion is at the lower poles with the pelvis lying just anterior to right sacro-iliac joint and the other just lateral to the fourth and fifth lumbar vertebræ.

granular layers a cyst is formed which begins to lay down laminated membrane and gradually becomes separated. It may by independent growth acquire an adventitia of its own. The process is not merely passive due to intracystic pressure, but once it is started there is active growth of the layers of the pouch parallel with that of the original cyst. This method of secondary cyst formation may be seen under almost identical conditions in young daughter cysts which have been produced in a normal endogenous manner. In these the laminated membrane is often thin and transparent and is totally unsupported except by neighbouring cysts or surrounding fluid. In some cases, whether due to increase in the intracystic pressure, to local weakness of the laminated layer or to both factors combined, hernia-like protrusions of the whole thickness of the cyst wall form. The opening of the protrusion may be easily seen in some cases, though in others it is fine and difficult to recognize in profile (see Figure IX.).

The pouch thus formed continues to grow *pari passu* with the original cyst, the neck becomes constricted until it closes off forming a small cyst which remains attached by its cuticle to the original cyst. The eversions may be multiple and may repeat themselves, giving rise to tertiary and even quaternary cysts. Rasmussen[5] first noted this method and believed that Leuchart, Davaine and Nauyn had wrongly interpreted the mechanism and had based the hypothesis of intracuticular daughter cyst formation on it. He drew attention to the fact that the hernia-like protrusion may at a certain stage come to lie in its "hernial canal," that is in the thickness of the original laminated membrane. In this way the appearance of an intracuticular origin may be closely simulated. All my observations agree with those of Rasmussen and this must be regarded as a well substantiated subsidiary method of endogenous daughter cyst formation by which tertiary or even quaternary cysts can develope. It is, however, relatively rare and only a comparatively small number of the numerous daughter cysts found in a large cyst are developed in this way.

In hydatid of bone the conditions of growth are at first glance very different. When the embryo comes to rest in the cancellous tissue of bone, it attempts to form a spherical cyst. Owing to the dense surrounding tissue this is impossible and the growing parasitic tissue spreads in a line of least resistance along the bony canals (see Figure X.).

The rate of growth of the parasite is extremely slow, so that the condition does not manifest itself till many years after infection. The final picture is one of gelatinous infiltration of the cancellous tissue of the bone. When a relatively large bony space is entered, a small cyst a few millimetres in diameter will form. Microscopically the structure is remarkable and may bear only a slight resemblance to classical hydatid cysts. There is no regular adventitia so that the parasitic tissue may actually lie in contact with bone in places and tends to erode it. In other places there is a definite tissue reaction and this may be evidenced by the presence of numerous "foreign body giant cells" which can be seen eroding hyaline *débris*. There is little or no fluid production so that the small cysts may be semisolid. Hyaline material is laid down irregularly and in excess. There is as a rule no production of scolices while the parasite is in the bone. Areas of degeneration and caseous change are common and in these areas phagocytic giant cells can often be seen removing the *débris*. As the condition advances the bone becomes eroded and replaced by small hydatid cysts, the medullary cavity is invaded and the bone gradually weakened so that spontaneous fracture is common.

The conditions in hydatid of bone resemble somewhat those in omental cysts in that in both there is extreme variation in the resistance of the adventitia and surrounding tissues. In bone, therefore, the appearance of exogenous formation is due to herniation of pouches in the line of least resistance along bony canals. These later owing to fusion at the narrowed neck become cut off with resultant secondary cyst formation.

Figures XI. and XII. are microphotographs illustrating this method of secondary cyst formation.

After a time the redundant hyaline material is often ingested and removed by phagocytosis so that all connexion between the cysts may be missing. These cysts are not comparable to endogenous daughter cysts, as the growth is a continuous one from the beginning and no true mother cyst exists. That the adventitious tissues are all important in determining the morphology of bone hydatid is shown by the fact that once the parasite invades extraosseous tissues, either intramuscular planes or a cavity like the pelvis, it very often assumes the typical spheroidal shape. Many observers have noted this and several clinical cases have been recorded (Watson,[13] Verco and Stirling[14] *et cetera*). Such cysts may contain brood capsules and scolices, the latter being in every particular identical with those obtained from typical cysts of any other organ. No examples of true exogenous daughter formation in such extraosseous cysts have been recorded, though typical endogenous daughter cysts may be produced. I have recently seen two cases which illustrate these points well.

H.J., *ætatis* thirty-six years, was admitted with a swelling in left side of the neck and some pain in the shoulder. Exploration with a needle revealed hydatid fluid and laminated membrane. X ray picture revealed erosion of the transverse process and bodies of first and second thoracic vertebræ. At operation a large typical hydatid cyst was found under cover of the trapezius muscle, extending down to the transverse processes of the vertebræ. Hemi-laminectomy was performed with removal of much infected bone containing typical hydatid of bone. A mild degree of infection of the wound occurred and some root pains developed. These gradually cleared up. During the next two years he had a constant slight discharge containing now and then typical small cysts. After six months a swelling appeared in the left scapular region. This was excised under local anæsthesia and proved to be a spherical cyst containing brood capsules. Later he developed paraplegia and root pains with signs of com

pression of the cord at about the third thoracic segment. Further operations were performed for the relief of pressure. One intraspinal, extradural cyst was removed and several collections of small cysts in the bone of the pedicles of the lumina were cleared out. The former was a typical spherical cyst containing brood capsules and had evidently formed by direct extension from the bone.

In this case the primary disease was in the bone where it had slowly invaded the cancellous tissue of the upper thoracic vertebræ. The parasitic tissue had, however, made its way out of the bone and entered the postvertebral muscles and the spinal canal and in both situations it formed typical spherical cysts, containing brood capsules and scolices.

In the other case conditions were comparable.

The primary disease existed in the sacrum and ilium. After several operations the parasitic tissues made their way into the pelvis and here formed fairly large typical hydatid cysts which caused pressure and were removed by operation.

Corlette[18] recorded an interesting case of extensive osseous hydatid of very long standing associated with extension into extraosseous tissues and hydatid of the lung. He suggested that multiplication of cysts in bone is due to rupture of a fertile cyst and sowing of hydatid "embryos" with secondary cyst formation and that the process is very similar to that which produces multiple omental hydatids.

There seems to be no reason for this complicated mechanism, although there is no doubt that it is the explanation of multiple omental hydatids and some hydatid cysts of muscle.

I have emphasized in a previous article[1] the influence of muscle contractions, age and nutritional insufficiency on the formation of daughter cysts and suggest that in the case recorded by Corlette all these determined the formation of large numbers of extraosseous daughter cysts which were probably endogenous cysts, the original mother cyst having become disintegrated. It is beyond the scope of this paper to discuss the vexed question of nomenclature or the various morphological forms of the parasite found in the *herbivora*. With regard to the former, as far as I can ascertain, no one has yet recorded in Australia any true case of *Echinococcus alveolaris*, as it occurs in certain areas in Europe. In sheep and oxen multiloculated and multicystic tumours occur very frequently especially in the lungs of the former and the liver of the latter. The tissues of these animals react by an exceptionally early and dense sclerosis of the adventitious tissues with consequent reduction of nutritive substances and restriction of growth. The conditions of growth and the method of extension in these cysts seem to be determined, just as in the case of bone, by the arrangement and density of the surrounding tissues. All stages of loculation from simple sacculation to complete severance of multiple small cysts may occur.

It is hoped that observations on the morphology of hydatid disease in these animals will be made the basis of a future paper.

My clinical and pathological observations force me to the belief that osseous and omental cysts in man and the multiloculated hydatids so universally found in the viscera of the *herbivora* are all morphological variations of the cystic stage of the same *tænia*.

Application to Clinical Medicine.

Certain of the above facts have interesting applications to medicine both as regards pathology, clinical course and treatment.

Secondary Echinococcosis.

The fact that daughter cysts, brood capsules and scolices can implant themselves and give rise to secondary echinococcal cysts is now well established. The experimental implantation of fresh daughter cysts was first carried out by Lebedeff and d'Andrey in 1899. The fact that brood capsules and scolices could also become implanted was not generally admitted till more recently. John Hunter in 1793 first formulated the idea that pelvic cysts were often due to rupture of a visceral cyst and not to multiple infestation. This was criticized by Charcot and Davaine on purely theoretical grounds. Bright in 1861 revived this hypothesis and emphasized the danger of dissemination by operation or puncture. Potain and Valknan in 1877 also warned surgeons against the risk of sowing hydatid elements by puncture. D'Alexensky in 1898 first obtained positive results from the intraperitoneal inoculation of hydatid sand and Dévé and others have now put the matter beyond all doubt. In addition many clinical cases have been recorded in which this phenomenon has occurred. These elements may be set free by puncture, by traumatic rupture or by imperfect operative technique. The phenomenon of multiple omental and abdominal hydatids is not uncommon and in most cases a history of some interference or accident to the cyst can be obtained. Following the leakage of a cyst in the abdomen even through a comparatively small needle puncture there will be absorption of hydatid fluid with the possible production of anaphylactic symptoms and the escape of brood capsules and scolices. In some patients who have been operated on a few months after puncture or rupture of a cyst as indicated by the history of upper abdominal pain with or without anaphylactic symptoms, the peritoneum and omentum have been found studded with small tubercles which are the beginning of small cysts derived from spilt brood capsules or scolices. In other cases these elements do not progress as far as macroscopical cyst formation, but the reaction of the tissues is so great that a pseudotuberculous thickening of the omentum and peritoneum may occur. No doubt many of the thousands of scolices which may be spilt, fail to survive, but in gross cases of which many have been recorded, multiple cysts form and may fill the whole abdominal cavity—the condition known as hydatidosis. It has been stated that such a massive development of secondary cysts may lead to a hydatid cachexia. These secondary cysts show because of the influence of gravity a great predilection for the pelvic basin, hence in all cases of multiple pelvic or omental cysts the liver should be suspect and should always be examined. In the

majority of cases evidence of previous rupture will be found in the shape of a scar or the presence of a recurrent liver cyst containing daughter cysts developed from residual brood capsules or germinal membrane.

There is no doubt that most cases of multiple cysts in the pleural cavity have a similar explanation. The time taken for the development of such secondary cysts necessarily varies, but it is always a matter of several years and cases have been recorded in which recurrence of the disease has been delayed for twelve to fifteen years.

Recurrent Hydatid Cysts.

Recurrent cysts after operation are not uncommon either in the region of the scar or near the site of the original cyst. These are usually due to the spilling of brood capsules or scolices at operation. That they did not occur with more frequency in the older records was often only a matter of chance, only a certain proportion of the shed elements surviving the intense local tissue reaction in the region of the scar.

Operative Treatment.

Following puncture of a simple hydatid cyst cure may result, but in many cases recurrence of the swelling is noted some years later. The literature contains many references to the phenomenon. When such cysts are opened after a lapse of years, daughter cysts are invariably found and many observers have been struck by the frequent absence of the original mother cyst. These daughter cysts are produced from the original germinal cells or from brood capsules or possibly from scolices, the original mother cyst becoming disintegrated.

During evacuation of hydatid cysts the risks of spilling small daughter cysts, brood capsules or scolices is considerable. The former are usually large and with care can be all accounted for and removed. Occasionally, however, very small ones from one to five millimetres in diameter are present and may be easily missed, especially as they are elusive and difficult to keep under control. The fact that brood capsules or scolices can also become implanted in the various body cavities or in the region of the scar, introduces a much more important risk, as they are extremely small and can readily escape in the interstices of the wound. The recognition of this led various Algerian and French surgeons to introduce as long ago as 1898 the method of preliminary "Formalin" injection into the cyst contents. This consists of evacuation under sight by means of a trochar of a quantity of the fluid followed by the injection of an equal quantity of 2% to 5% "Formalin." This method causes death and fixation of the brood capsules and scolices after a contact of a few minutes. It is obviously necessary to gauge the size of the cyst in order to estimate how much "Formalin" is required to give a final concentration of at least 0·5% to 1%. The method is most applicable to simple cysts and as these usually contain many brood capsules and scolices, it has a great prophylactic value. It is now in common use all over the world. In cysts of the lung it is obviously not applicable owing to the risk of bronchial communications and here various other fixative agents such as mercury perchloride or alcohol may be used. In cysts containing daughter cysts the method is of little or no value as the resistant laminated membrane is very difficult to fix quickly and thoroughly. In these cases if many of the cysts are ruptured, "Formalin" may be used as a postoperative proceeding to swab out the cavity and so fix any scolices that have escaped.

Hydatid Embolism.

Another phenomenon that may occur as a result of the survival and persisting powers of scolices and brood capsules is hydatid embolism. This has been abundantly proved by Dévé by means of experimental intravascular injections and I have repeated some of his experiments with success. It is not infrequent to find in multiple infestations in animals small cysts projecting into the lumen of vessels, particularly the hepatic veins or *vena cava*.

The same condition may occur in cysts of any organ and rupture of such a cyst would cause brood capsules and scolices to be carried by the venous stream. Hydatid cysts of the walls of the heart also occur and are a potential source of similar emboli. There are thus two routes by which these emboli may spread with the formation of hydatid metastases, namely, venous or arterial. In the former which will occur when a peripheral cyst of the spleen, liver and so forth leaks into one of the systemic veins, the resultant cysts occur as a rule in the lung. Dévé[16] has collected from the literature four cases in which the above was the probable explanation. This phenomenon is characterized by multiple pulmonary cysts, often bilateral, of approximately the same size and usually situated in the peripheral zone of the lungs.

In the case of the arterial route the primary cyst occurs in the heart and many cases have been recorded. Dévé has collected twenty-four cases of cardiac hydatids in which metastases have occurred. If in the right heart (thirteen in Dévé's series) the resulting cysts will occur in the lung as described above. If in the left, the metastatic cysts appear in the brain (90%), the spleen, kidney or liver. Another possibility is the formation of multiple local cardiac or pericardial cysts.

The metastatic cysts are usually multiple and this is the explanation of the interesting fact that whereas most cysts of the brain in young people are single and primary, those occurring in adults are often multiple and secondary to a cyst of the left side of the heart. Sometimes original germinal elements in the original cyst may react after rupture by the formation of daughter cysts. The fact that secondary hydatid cysts can be produced by inoculation of brood capsules and scolices gives one a method of producing an experimental tumour. This could be applied to regions such as the brain or spinal cord and well controlled experiments with careful clinical and autopsy records might lead to valuable information.

Summary.

1. Daughter cysts in a typical hydatid cyst have an endogenous origin only. They usually arise by progressive evolution of the cells of the original germinal membrane or from brood capsules. More rarely they may develope from scolices. Their formation may be regarded as an expression of the powers of persistence of the parasitic cells.

2. From thin walled daughter cysts having the typical origin granddaughter cysts may arise in another way. This method consists of an external herniation of both layers at weakened parts of the laminated coat with secondary exclusion of the pouch. This is a rare method.

3. Exogenous daughter cyst production from intracuticular nuclear masses, as usually described, does not occur. In secondary omental cysts, in bone and in the viscera of *herbivora*, peculiar cysts form which are due to external herniation of both layers with secondary closure and cyst formation, such herniations being dependent on the nature of the adventitious tissues.

4. Secondary echinococcosis is a well established fact and may occur in the abdomen, in the pleura or in operation wounds as the result of implantation of daughter cysts, brood capsules or scolices.

5. Hydatid emboli and metastases can occur after intravascular rupture of cysts with carriage of brood capsules or scolices by the blood stream and their survival and growth in new situations. This is the explanation of most cases of multiple cysts of the lungs, heart and brain.

Acknowledgement.

My thanks are due to Miss Cecil Maudsley for the excellent photographs reproduced in this paper.

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THE DIAGNOSTIC VALUE OF PYELOGRAPHY.

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The introduction of X rays into the field of genito-urinary surgery has proved itself an invaluable addition to diagnosis. Because of the continual improvement in the cystoscope and its facilities for operative manipulation the genito-urinary tract can now be so thoroughly covered that pathological conditions have very little chance of evading the urologist.

Radiographic evidence alone may not be of great value, but when combined with the results obtained after the introduction of opaque substances into the genito-urinary tract conclusive evidence is established.

X rays may be employed with equal advantage in lesions of either upper or lower tracts and both before and after cystoscopy. A skiagram preceding cystoscopy may demonstrate an excessively large or abnormally shaped kidney or some abnormal shadows in the kidney area, while lower down a shadow may be defined in the course of the ureter or in the region of the bladder. These shadows, however, may not be due to a pathological condition in the genito-urinary tract, but their presence in a skiagram compared with a second picture taken after the introduction of an opaque catheter or fluid into the tract affords good contrast for comparative purposes.

As this article is to deal essentially with pyelography, a little will be said first concerning the employment of opaque media in the ureters and bladder.

Ureteral obstruction may be produced by various factors such as stone, stricture, tumour *et cetera* which may or may not cast a shadow in the X ray plate. On the introduction of an opaque catheter into the affected ureter it may become arrested at the point of obstruction or pass beyond it to the renal pelvis.

In the event of a shadow being cast, a skiagram definitely establishes its relationship to the catheter, this being particularly well demonstrated with stereoscopic radiography. If no shadow is cast or in the presence of a shadow which might be a calcified gland or a phlebolith, the introduction of an opaque medium into the renal pelvis and ureter will demonstrate in the case of a ureteral lesion a dilatation above the point of obstruction with a return to its normal calibre immediately below.

It might be mentioned here that shadows due to phleboliths are very commonly met along the course of the ureter in the pelvis, especially in the vicinity

of the ischial spine and these closely simulate and are often mistaken for stones in the ureter.

Opaque media may be employed for demonstrating certain bladder conditions, such as diverticula and occasionally tumour. By passage of a catheter and the subsequent introduction of an opaque solution until the bladder is full the extent and course of a diverticulum can be determined. In the same way a large tumour may encroach on the lumen of the bladder and produce a filling defect which may give some indication of the proportions of the tumour. The intravesical extent of prostatic enlargement can also be determined by substituting air for the opaque media. In this case the distended bladder area will show up darker than the surrounding structures and the degree of encroachment at the neck can be ascertained.

Historical.

The first pyelograms were made by Klose in 1904. He injected a suspension of bismuth into the renal pelvis and followed it by radiography. It soon became apparent that suspensions of bismuth were unsuitable for this purpose owing to residual deposits of bismuth being left within the pelvis and ureter.

Following this Voelcker and Lichtenberg, employing colloidal silver in the form of "Collargol," were able to produce a series of successful pyelograms. Although Klose was the first actually to carry out pyelography, it was Voelcker's and Lichtenberg's work which stimulated others to follow in their footsteps and although at first their work received little attention, its outcome is now regarded as one of the most valuable diagnostic aids in urology.

Following the efforts of these early pioneers various chemicals have been used for this purpose. Voelcker and Lichtenberg started with a 5% solution of "Collargol," but as it was essentially a suspension and toxic, its use was soon discontinued and solutions of argyrol and cargentos were substituted. These in turn were discarded for various reasons and Uhle and Pfahler advised the employment of an emulsion of silver iodide. Burns advocated a 10% solution of thorium nitrate which was a colourless solution, easily handled and because of its high atomic weight the resulting pyelograms were of much better quality than those produced by any of the preceding chemicals. Thorium, however, had its objections, as it was expensive, difficult to obtain and severe reactions sometimes followed its use.

Burkhardt and Polano first suggested using oxygen for purposes of pyelography and reported a series of cases. This technique, however, never found favour and was soon discontinued.

The use of sodium bromide and sodium iodide was advised later and at the present time these are the chemicals chiefly employed for pyelography, the bromide being generally used as a 20% solution and the iodide as a 15% solution. They have the great advantage of being cheap and easy to handle. They are readily sterilized without destruction of their efficiency and have little toxic effect. In fact they fulfil the necessary requirements of pyelographic media, for as is explained elsewhere, pyelographic media must be capable of intravenous injection without serious consequences.

Technique.

There are two methods employed for the introduction of the pyelographic media into the kidney pelvis, the gravity method and hand syringe. Care must be exercised with each method, as grave results can easily be produced. Since the earliest days of pyelography this has been known and periodically cases have been reported in the literature ranging from severe local reactions to fatal results following these procedures. After a too forceful introduction of the pyelographic media it was found that it passed beyond the renal pelvis and penetrated into the kidney substance and could even be recovered *post mortem* in the glomeruli and tubules of the opposite kidney. It was assumed that by the increase of the intrapelvic pressure the medium was forced up the kidney tubules and by some means managed to rupture either the walls of the tubules according to some authors or in the opinion of others passed right up to the glomeruli and there broke through into the renal parenchyma.

The writer during an investigation of the renal circulation studied the results produced by increasing the intrapelvic pressure in a series of animals. It was found that very little increase of pressure was required to produce a penetration of the media into the kidney substance and by the employment of a solution of Berlin blue the course of the liquid's penetration through the parenchyma could be followed. Instead of the blue being found in the lumen of the tubules and glomeruli it was observed to have passed directly into the renal venous system by way of the minute *venæ rectæ*. This backflow of the fluid from the pelvis into the *venæ rectæ* was accomplished without any obvious rupture of the renal parenchyma and in a sheep could be so completely done that the entire renal venous system became filled and gave the appearance of an injection made by way of the renal vein.

Seeing that this phenomenon could be produced in a normal animal at less than its renal secretory pressure, it was decided to investigate the result produced in hydronephrotic kidneys. Hydronephroses were produced by tying the ureters of some dogs and leaving them for intervals varying from two to ten weeks for the hydronephrosis to develope. It was found then that with the advancing degrees of hydronephrosis this backflow could be produced much more readily and at much lower pressures.

As a preliminary step before taking a pyelogram it is advisable for two reasons to get the renal pelvis as emptied of urine as possible. This is best accomplished by gently drawing off the urine with a syringe. By this means some idea of the pelvic capacity is obtained and at the same time, the pelvis being empty, the pyelographic media subsequently introduced will not be unduly diluted and in consequence a denser pyelogram will be obtained.

Some men advocate estimating the capacity of the pelvis beforehand by introducing sterile water till the patient complains of discomfort in the kidney area. This technique is liable to error as the water in many cases leaks past the ureteral catheter into the bladder without increasing the intrapelvic tension enough to cause discomfort. A better procedure is to withdraw the urine from the pelvis and estimate the content in that way.

The capacity of a normal pelvis varies with the size of the individual. A big man will have much larger kidneys than a child; anything from five to twelve cubic centimetres would come under the normal heading. Whatever the capacity of the pelvis may be, any increase of its normal tension is immediately attended by discomfort. The nearer to normal the capacity of the pelvis, the more acute the discomfort produced.

With advancing development of hydronephrosis the pelvis accustoms itself to an increase of tension within it and any additional pressure superimposed on this produces only a moderate degree of discomfort. With very advanced conditions of hydronephrosis amounts much in excess of the sac content can be introduced with the production of very little discomfort. This fact is misleading and at times has lead to fatal results due to the passage of toxic media from the pelvis into the blood stream. This is especially liable to occur in cases of hydronephrosis, for as experimentally demonstrated, pyelogenous backflow is produced much more readily and at much lower pressures under these conditions.

Following pyelography performed as a routine measure it is advisable to withdraw the media from the pelvis. This will frequently relieve any discomfort experienced by the patient with a normal pelvis and in conditions of hydronephrosis it becomes practically essential, as these large sacs are often not capable of emptying themselves and the media retained are absorbed.

The establishment of a differential diagnosis in certain pathological conditions of the kidney can be extremely difficult, even given full urinary and X ray findings. Notice may be directed to the kidney either by urinary abnormalities, pain, the presence of a tumour in the renal area or a combination of these. A tumour may be caused by hydronephrosis with or without stone, pyonephrosis, neoplasm, tuberculosis, polycystic kidney or various other less common conditions all of which are capable of giving somewhat similar urinary findings.

The addition of pyelographic evidence is of paramount importance in the differentiation of any of these conditions and in many instances will definitely establish the diagnosis independently of any urinary findings. In doubtful cases a careful correlation of the urinary and radiographic findings reduces the chance of diagnostic error to a minimum.

Types.

Pathological changes in the kidney such as call for surgical interference, are generally attended with characteristic findings on pyelography and even if not definitely typical of some particular condition the abnormal changes will indicate the necessity for further investigation.

A patient may complain of symptoms strongly suggestive of a renal lesion and on examination all urinary and radiological findings yield no result, indicating that the trouble is elsewhere and that the genito-urinary tract can be excluded. In the case of another patient complaining of nephralgia examination may yield no information throughout, a pyelogram taken in the prone position may be perfectly normal, yet when taken with the patient in the upright position it may show that the kidney has fallen right down into the bony pelvis.

Stricture of the ureter, a condition which owing to the efforts of Hunner is recognized as the underlying factor in a great many obscure forms of nephralgia, can be very readily demonstrated with the pyelo-ureterogram. This condition can be diagnosed by the obstruction met on the introduction of a ureteral catheter or by the catch produced on the passage and withdrawal of a wax bulb catheter. These results could equally well be produced by ureteral stone, but while a wax tipped catheter will pass a stricture without being affected, a stone will produce a scratch.

The best way of demonstrating ureteral stricture is to pass an opaque catheter and then introduce pyelographic media until sensations of discomfort are produced. A pyelo-ureterogram will then show dilatation of the ureter down to the point of stricture with a return to its normal calibre below (see Figure I.). Clinically these conditions of ureteral stricture in their early stages, while not as yet causing any great changes, are the cause of an increase in the renal intrapelvic tension which is enough to produce pain and a deficient drainage.

A persistent mild pyelitis or a persistent nephralgia will occasionally clear up by the mere passage of ureteral catheters dilating the stricture and establishing free drainage.

Stone.

Stone in the kidney may cause a variety of symptoms ranging from the most excruciating renal colic to no discomfort whatever. Silent stone is quite common, its presence often being discovered accidentally during the course of a general overhaul. An interesting fact with regard to these silent stones is that often the larger the stone, the less the disturbance and in addition when pain is present, it is frequently referred to systems other than the genito-urinary.

For the diagnosis of stone the radiogram offers great assistance, but while it is probably the most useful, it has the faculty at times of being most misleading. A plain skiagram may show a shadow which is definitely stone, it may fail to cast any shadow or it may cast a doubtful one. Failure to find stone by X rays does not exclude the presence of stone, but merely means that its composition is such that it does not show.

In the last few months the writer has had personal experience of two cases in which stone was

proved to be present after X ray examination failed to demonstrate its presence. Figure IV. represents the condition seen in a patient with multiple kidney stones. These failed to be registered on a good plain plate. In the second case a man reported to be free from stone by two independent radiographers was observed to have in his bladder three stones averaging 1·8 centimetres (three-quarters of an inch) in diameter which were crushed. In view of the fact that X ray examination had revealed no stone, he was again examined radiologically before the stones were crushed and while a good picture was obtained showing in detail the sacrum and coccyx, there was no definite shadows cast by the stones.

A combination of cystoscopy and radiography ought in all instances to give a positive diagnosis in cases of stone. In the presence of a shadow in the plain skiagram the introduction of opaque catheters into the ureters followed by a stereoscopic radiogram ought to determine the locality of the shadow. If there are very definite symptoms suggesting stone, but no shadow is seen in a radiogram, there are two procedures which should settle the point.

The older of these is the introduction of the wax tipped catheter which will be scratched by a stone if it lies in the course of the ureter or about the uretero-pelvic junction, but might not be affected if the stone were lodged in one of the calyces. The other method is the pyelogram. In the presence of stone in the kidney which is not casting a shadow, the introduction of opaque media into the pelvis will generally render it evident.

In the first place the presence of a stone will probably have caused a moderate degree of pelvic dilatation and secondly the areas occupied by transradiant stones will show up as areas of deficient density in the pyelogram. This is well illustrated in FigureIV. taken from a patient with multiple stones which failed to cast a shadow in the plain plate. Here the periphery of the stones is rendered evident by the denser shadow cast by the increased amount of bromide.

X ray examination alone, while a most valuable method for diagnosing stone, is not entirely reliable, but combined with cystoscopy, ureteral catherization and pyelography it affords a practically certain diagnosis.

Hydronephrosis.

The value of pyelography in the diagnosis of early conditions of hydronephrosis can hardly be overestimated. In these early cases when the obstructive factor can be overcome and before the damage done to the kidney function has passed the border line from which it is unable to recover, the diagnosis can be made only through the agency of a pyelogram. Not only can the condition be diagnosed, but also the type and site of the obstruction can be determined.

In the case of advanced hydronephrosis with the hydronephrotic sac distended with urine, the diagnosis is relatively easy (see Figure II.) and under these conditions pyelography is hardly necessary and somewhat contraindicated. This is based on the fact that, as previously stated, large sacs do not readily empty themselves and the medium is retained, causing at times severe reactions and considerable pain in the kidney.

The important thing to determine is the cause and site of the obstruction, whether it is in the pelvis, at the uretero-pelvic junction or in the ureter and in order to include the last point, it is advisable after filling the pelvis, to withdraw the ureteral catheter past the uretero-pelvic junction and again inject a little of the medium, thereby obtaining a pyelo-ureterogram.

Tuberculosis.

In conditions of renal tuberculosis if from the cystoscopic examination, ureteral catheterization and a bacteriological examination of the urine a diagnosis of unilateral renal tuberculosis can be established, it is better not to carry out pyelography. There is always a possibility of a tuberculous lesion being aggravated by such procedure and in cases of bilateral renal tuberculosis where unilateral nephrectomy is usually contraindicated, serious consequences may result.

The information gained from pyelography in these conditions is not of much value and seldom justifies its use if a diagnosis can be made from the presence of tubercle bacilli, pus and blood in the kidney urine. In pyelograms of tuberculous kidneys, providing the condition is sufficiently advanced to be registered, the predominant changes in the early stages consist of a nibbling away of the calyces, producing an uneven outline first of the calyces and later of the entire pelvis. With more advanced cases this gradual destruction continues and as a result of this and the degree of obstruction produced by the thickening of the ureter ultimately the kidney becomes reduced to a condition of tuberculous pyonephrosis.

Tumour.

Nowhere in the realm of urological diagnosis does pyelography play so important a rôle as it does in the early diagnosis of tumours of the kidney. It is in these stages when there are as yet no other symptoms than perhaps the presence of blood in the urine discoverable only on microscopical examination, while the prognosis is still good and the proportions of the tumour are not such as to render its removal impossible, that pyelography plays such an important part.

Tumour first becomes evident by its encroachment on the normal outline of the pelvis; in the early stages it will probably be confined to one calyx or one pole. Figure VIII. is a typical example of this condition where the tumour is of the lower pole only and has by its encroachment obliterated the lower calyx altogether. With the progressive enlargement of a neoplasm the pelvis becomes more and more distorted, the body and calyces become attenuated and compressed till the classical spider leg deformity, typical of neoplasm, is produced (see Figure IX.).

Frequently, too, in these cases of tumour after the pelvis has been filled with sodium bromide, areas in the attenuated calyces seem to become shut off and detached from the main body of the pelvis, as is well illustrated in Figure IX. In addition to the definition of tumours of the kidney itself, primary neoplasms of the pelvis may be diagnosed in the same way through the medium of pyelography.

Polycystic Kidneys.

The radiographic diagnosis of polycystic disease may be extremely difficult and the difficulty is dependent on the degree of advancement of the lesion. In very early conditions a diagnosis is impossible, as the minute dimensions of the cysts at this stage have not caused any distortion of the pelvis. However, with the progressive development changes commence to take place in the normal pelvic outline. Figure VI. illustrates the early attenuation noticeable in the calyces and these changes progress until the extreme condition seen in Figure VII. is reached.

The pyelogram of polycystic kidneys has certain characteristics in spite of the extreme variations possible with its extent of development.

The condition is almost universally bilateral and this would help differentiate it from tumour. The pelvis is generally very large, but does not as a rule show evidence of obstruction or contain a large quantity of residual urine and this distinguishes it from hydronephrosis. Again, the outline of the parenchyma of the kidney is greater in proportion to its pelvis than in the normal and this will still further differentiate it from hydronephrosis.

It would be difficult to diagnose the condition seen in Figure VII. as either hydronephrosis or neoplasm, especially in view of the bilateral condition. This practice of the simultaneous taking of bilateral pyelograms is not to be commended, as it is sometimes attended with serious consequences, such as suppression of urine; even fatal cases have been recorded.

Congenital Anomalies.

As is well known the kidneys and ureters are subject to various congenital anomalies. Formerly these conditions were reported from the *post mortem* room or else were actually observed on the operating table.

Since the advent of pyelography these conditions can be demonstrated and studied clinically with the result that they have proved much more common than previously supposed. The normal renal pelvis is made up of the true pelvis, the major calyces and the minor calyces. The true pelvis is more or less pyramidal in outline, having usually three major calyces, with the minor calyces extending for a short distance beyond the major.

The true pelvis may become separated into two main subdivisions, forming the so-called bifid pelvis or the divisions may extend further, so that instead of the pelvis subdividing, the ureter divides, resulting in a branched ureter with a double pelvis. If the division extends down to the bladder, a condition of double pelvis may occur, each with its own ureter opening separately into the bladder.

In addition to this type of anomaly, one kidney may be missing or both kidneys may be lodged on the one side of the body, solitary fused kidney or else the kidneys on either side may be connected across the midline by their upper or lower poles, forming the so-called horseshoe kidney (see Figure X.). No matter what the abnormality may be, the great diagnostic agent is again the pyelo-ureterogram.

The problems of differential diagnosis in lesions of the urinary tract, especially those presenting an atypical history, are known to all. Patients suffering from these obscure conditions were frequently subjected to one or more exploratory operations, many times without benefit. It is in the differential diagnosis of these numerous and various lesions that pyelography plays such an important rôle. Although at first it met with strenuous opposition, one is justified in stating that there is now no diagnostic procedure whose accuracy and value is more generally recognized.

Reports of Cases.

TRIPLE PREGNANCY WITH PLACENTA PRÆVIA, ABORTION AND POST-PARTUM HÆMORRHAGE.

By Arthur E. Brown, M.R.C.S. (England), L.R.C.P. (London), M.B., Ch.B. (Cambridge);

and

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Colac, Victoria.

This case is reported purely as being of interest from the unusual combination of circumstances and not as being of any great instructional or statistical value.

The patient was a farmer's wife, aged twenty-nine, with two children. She said she had bled badly after her last confinement. She was seen in August and stated that she thought she was about two and a half to three months pregnant. She was worried by "pieces of flesh" coming away by the vagina. There was no pain and the "pieces" were considered to be blood clots. She was sent home to rest. Ten days later she reported an unpleasant vaginal discharge and that two nights before she had had a distinct blood loss. She was admitted to hospital. There was an offensive bloodstained discharge from the vagina, but the temperature was normal. Her condition was diagnosed as an arrested pregnancy and the cervix was packed with gauze to induce abortion. This however did not occur and on August 29 it was decided to empty the uterus, instrumentally. The introduction of the curette was the signal for a very profuse hæmorrhage which did not ease until the uterus was emptied. The uterine contents consisted of three dead fœtuses and a formed placenta which was situated entirely in the lower pole of the uterus. The separation of this by the curette was the cause of the free bleeding.

When the free hæmorrhage eased the uterus continued to ooze at an unusual rate in spite of hot douching, repeated "Pituitrin" injections and finally packing the cavity with gauze. The woman was given saline solution intravenously and under the breast, but her condition became worse and the oozing from the uterus continued. Finally a Group IV. blood donor was procured and six hundred cubic centi-

metres of citrated blood were given intravenously. The response was not very great, but her condition improved sufficiently to allow of further measures and supravaginal hysterectomy was performed under local anæsthesia as she lay in bed. A little ether was given during the peritoneal manipulations. The operation took only fifteen minutes and she lost certainly no more blood than she would have lost had the uterus been simply oozing at the same rate as before. Improvement was steady after the bleeding had once been controlled and she made a good and uninterrupted recovery.

Examination of the uterus after removal showed no reason why she should have bled so badly. The contents had been cleanly removed. There were no fibroids nor any other abnormality in the wall which appeared perfectly healthy.

Reviews.

A TEXTBOOK ON OPHTHALMOLOGY.

SWANZY'S handbook on diseases of the eye is too well known to need an introduction and so deservedly popular with a large circle of readers that little remains but to welcome the thirteenth edition and to congratulate the editor on his determination to bring the work up to date.[1] There is, however, surprisingly little new matter in the present volume, the author being no doubt unwilling to cut out old matter or to increase the size of the book. For instance there are just passing references to the slit-lamp which may indeed come into more general use with the newer generation. In the newly written chapter on iritis the author still gives 50% of cases a syphilitic origin which certainly in this country is too high. It is only with chronic iritis that he entertains infection from a septic focus as a cause. It is difficult to follow this distinction between acute and chronic iritis. We have all seen many cases of acute iritis as the result of an apical abscess or septic mouth. Special reference might be made to the excellent chapter on ocular diseases accompanying focal diseases of the brain in which Gordon Holmes's survey of the occipital cortex is admirably described. The student of ophthalmology who takes Swanzy for his guide, makes a fortunate choice.

PHYSIOLOGY.

THE second edition[2] of the excellent "Practical Physiology" of Professors E. P. Cathcart, D. Noël Paton and M. S. Pembrey shows some extensions and revisions. The chief difference between this edition and its predecessor is the inclusion of a chapter on physiological histology. A justification for this action is given in the preface and it is rightly said that a sound knowledge of structure is necessary for the study of function. And yet careful reading fails to disclose any essential difference between this histology and that taught in our medical schools. We cannot see why these histological exercises should be here; if they constitute the student's only course of instruction in microscopic morphology, they are inadequate; if they are supposed to supplement his teaching in the subject they are merely repetitive.

The other chapters attain to a high standard. Originality in a book of this sort can hardly be expected, and yet originality displays itself. Some of Professor Pembrey's exercises on circulation, respiration and animal heat will be welcomed by teachers of physiology and the authors have been fortunate in securing a contribution from Dr. Arthur Hurst on the X ray examination of the alimentary canal. The chemical part is up to date and thoroughly practical.

A few criticisms of detail may be given here. The contrast between the extensibility of a muscle and that of a rubber band throws no particular light on muscle substance, except that it indirectly demonstrates the connective tissue framework. A similar graph will be given by any woven material, such as the student's neck-tie. Why should British textbooks of physiology give long elementary explanations of polarized light, often with very crude analogies and from the standpoint of modern physics often rather out of date? Is it that the preliminary training in natural philosophy is defective in many British medical schools? Professor Cathcart rightly prefers gravimetric and volumetric to colorimetric analysis. The latter has been resorted to far too much by physiologists and pathologists. Yet the Folin and Wu methods for estimating uric acid and sugar are given without any indication of the difficulty in obtaining sodium tungstate of the requisite purity. The Haldane method of estimating oxygen in blood by ferricyanide should be replaced by the same investigator's later and much more elegant device. There is a double index, one for experimental physiology and the other for chemical physiology.

MEDICAL EDUCATION.

THE subject of medical education has been handled by very many members of the medical profession within recent years. Although it is evident that those who have trained themselves in this branch of learning, are the most competent to judge the requirements of medical education, there is one danger inseparably connected with the uncontrolled judgement of a specialist in one or other of the medical sciences, namely that he is influenced in his decisions by his special training. In these circumstances we welcome the work of Mr. Abraham Flexner, a lay educationalist, because the author is free from bias engendered by the adoption of a medical specialism. Mr. Flexner has devoted himself wholeheartedly to a thorough study of the systems of medical education in Europe and America during the past fifteen years and has obtained the greater part of his information at first hand. He has sought the genetic principles on which each system has been based and has examined these data from a purely objective point of view. His book "Medical Education" is in consequence one of the most important publications on the subject that has appeared in modern times.[1]

He argues soundly that medicine for this purpose must be classified as a science. He attaches much importance to this question, because the training of students must be differently moulded according to whether medicine is regarded as a science or not. He admits that his definition of science is broad and is not limited to quantitative expression. Superstition and empiricism still lurk in the practice of medicine, but the modern tendency is to observe, analyse and measure. The effort in medicine is scientific and in consequence he claims that the whole training must be cast on scientific standards. This matter is of paramount importance, yet it may be anticipated that opposition to Mr. Flexner's view is likely to arise within the medical profession. Many surgeons and some clinicians favour what they term "practical" teaching, on the ground that it is beyond the scope of the general practitioner's activity to deal with disease from the aspects of biochemistry, biophysics, biology, pathology and immunology. We agree with Mr. Flexner.

The second problem attacked in his book takes the form of a detailed description of existing medical schools. He points out that three distinct types have arisen. The clinical type of medical school originated in France and is highly developed in Great Britain. It is unnecessary in this review to go over the ground covered by Mr. Flexner in his

[1] "Swanzy's Handbook of the Diseases of the Eye and their Treatment," Edited by Louis Werner, M.B., F.R.C.S.I., Sen. Mod. Univ. Dublin; Thirteenth Edition; 1925. London: H. K. Lewis and Company, Limited. Demy 8vo., pp. 714, with illustrations. Price: 21s. net.

[2] "Practical Physiology," by E. P. Cathcart, M.D., D.Sc., F.R.S., D. Noël Paton, M.D., LL.D., F.R.S., and M. S. Pembrey, M.A., M.D., F.R.S.; Second Edition; 1925. London: Edward Arnold and Company. Demy 8vo., pp. 422, with illustrations. Price: 18s. net.

[1] "Medical Education: A Comparative Study," by Abraham Flexner; 1925. New York: The Macmillan Company. Royal 8vo., pp. 334. Price: $2·50.

description of the variations of the clinical types of school. His data are substantially correct. Moreover a challenge will probably not be issued in regard to either the accuracy of his description of the modes of teaching or the justification for his pointed deductions concerning the objectives of this type. He cites chapter and verse in support of his contention that the student in the clinical medical school is taught medicine by seeing it practised and by helping his teachers to practise. This signifies that the teachers are pure clinicians; they regard their tasks as limited to the imparting of orthodox knowledge. Pathology and even anatomy at one time were taught by clinicians and even physiology occupied a minor place in the curriculum. More recently pathologists, anatomists and physiologists have secured control of their special departments, but Mr. Flexner states that their independence was grudgingly yielded. These sciences, he adds, are taught under the influence of clinicians, as mere subsidiaries to clinical teaching. He deplores the fact that the student in the French and British schools is not encouraged to become an original thinker and is given no opportunity to engage in experimental research. He is taught medicine from the narrow outlook of the individual patient. That a change is in sight is manifest to Mr. Flexner, since both Oxford and Cambridge have partial medical schools established for teaching and research in the fundamental sciences and well equipped modern laboratories are springing up in the institutions attached to the University of London.

The second type of medical school is the university type. This type had its origin in Germany and is encountered in Scandinavia, Holland and the German-speaking part of Switzerland. Mr. Flexner discusses at considerable length the conception of the university type. He mentions that the men who developed scientific medicine and surgery in Germany were in the first place soundly trained in anatomy, physiology, chemistry and pathology. Many of these clinicians have attained eminence in one or other of the fundamental sciences. In the next place he calls attention to the difference in the form of training given at the German universities as compared with the French or British clinical schools. Research is prominent and encouragement is given to all to foster the spirit of research. The master investigates in order that he may teach at first hand and demonstrate what he has discovered. The existence of this form of medical education led to the establishment of first class laboratories in every medical school and university with ample facilities for research. Mr. Flexner holds that, while every country has produced its exceptional men of science, men who would become eminent under any set of conditions, Germany contributed more than any other country to the building up of modern physiology, chemistry and physics because the system permitted of the training of scientists. The information contained in his description, as far as the facts are concerned, is unassailable. The deductions are logical and reasonable. But we venture to suggest that he has not given the complete picture. The standard of secondary education is high in Germany; the boy leaving school and entering the university is already well trained in the classics, in mathematics and modern languages. His medical education is as Mr. Flexner describes it, a continued training in science and its application to clinical practice. In the German university clinic the patient is to a great extent part of the equipment for teaching. In Great Britain there may be too much individualization and regard for the person of the patient; in Germany there is too little. The result is that the British school produces a better general practitioner, even though Germany advances the cause of science to a larger extent. In the next place the German is essentially frugal and contented with relatively small financial gain. The British doctor recognizes his value to the State and demands adequate payment for his services. In other words Mr. Flexner rather ignores the national characteristics in tracing the effects of the systems. Tradition, mental attitude and emulation are important factors in every national problem. Moreover, it would seem that the British student insists on working to pass his examinations in order that he may practise medicine; the German student works in order that he may accumulate knowledge. The two points of view are different.

The third type, called the proprietary type, "already so discredited as to have become absurd," had its birth in the United States of America. His indictment of the commercialized American college as a school of medicine is severe, very severe. He calls attention to the inadequate preliminary requirements, the short courses, the faulty arrangement of the curriculum, the dominance of the didactic lecture, the meagre appliances for demonstration and so forth. He traces the history of the attempt to counteract the evil influence of these schools culminating in the establishment and development of the great American schools at Harvard, Ann Arbor and Baltimore. He leaves the reader in no doubt concerning the defects and the advantages of individual institutions not only in the United States of America but also in all other great countries. He makes no excuse for the bad in America as elsewhere. He praises the good without stint, when the system, the organization and the administration are flexible and thorough and when activity and enthusiasm are given free play.

In the chapter on general education he delivers some very sensible lessons. Incidentally one or two of them are worthy of notice by Australian parents and school children. He concludes after detailed examination that secondary education in all countries is in need of readjustment. He deprecates the formal, conservative tendencies on the Continent; he finds that both in England and in America there is insufficient belief in intellectual quality. He wants to fashion secondary education for medical aspirants in such a manner that the intellectual qualities of the child may be awakened and permitted to develope under helpful intellectual leadership. He appreciates the value of the old world cultural treasures; they need adjustment to the conditions of modern education. America, he states, possesses neither definite educational standards nor large cultural resources. If this fact be recognized, the remedy can be applied. He emphasizes the enormous advantage of the French school in which precision in speech, exactness in statement and elegance in form are insisted on. How many British or Australian medical students have the power to write or to speak correctly, even if no demand be made for elegant diction?

Mr. Flexner passes on to a discussion of the basic sciences—fundamental sciences we should prefer to call them—and here again he manifests wide information, perspicacity and good judgement.

In his inquiry into the existing forms of curriculum and into the shortcomings of these Mr. Flexner is perhaps a little disappointing. It is true that he describes and evaluates with consummate skill the methods obtaining in various schools in various lands. He criticizes, where he opines that criticism is needed; he often praises in spite of what appears to us to be obvious defects. Nevertheless there is much to be learned from his discussions and from his records. The book also contains chapters embracing exhaustive analyses of the teaching of the laboratory sciences and of training in clinics. The last chapter deals with the cost of carrying out medical education. The position of today is compared with that of fifteen years ago. The keynote of the economic side of medical education is value for money. Mr. Flexner realizes the immeasurable value to the community of adequate and effective training of the future generation of doctors. Prices have increased by leaps and bounds since the war; the ideals have to be discovered and the medical schools reconstituted to satisfy all the modern demands. The cost will necessarily be heavy, but if the training and research associated with university life be of a high standard of excellence, they are worth paying for.

Mr. Flexner is to be congratulated on having written the best book we have encountered on modern medical education. His own method of presentation is to a large extent admirable. He can and usually does write very well. At times he lapses into careless American slang. We do not agree with all his conclusions; but we admire his consistent logic and his careful array of facts on which he has drawn these conclusions. No one interested in medical education today can afford to neglect this splendid and most industrious contribution.

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Motherhood.

The main functions of every animal, man included, are procreation and alimentation. The former is the more important from the racial point of view, while the latter is primarily individualistic, although it has naturally an indirect bearing on the maintenance of races. Nature, left to her own devices, is notoriously extravagant in her provision for the propagation of all species. She produces an enormous excess of germ and sperm cells; the period of fertility of female animals of all species is sufficiently long to enable each to produce many young, while plural births are common in all animals and the rule in the majority. The human race is capable of increasing at a great rate. The average woman has a period of productivity of about thirty years and Nature gives her opportunities of bringing into the world a family of twenty or more. *Homo sapiens* differs from other animals in a deliberate opposition to Nature's methods. What is known as civilization is responsible for many of the difficulties of the human race. Endowed with a very limited understanding and intellectual equipment, man has created for himself artificial environments, strange methods of protecting himself against atmospheric variations, unnatural forms of food and habits that tend to the deterioration of the racial physique. Under these conditions childbirth has apparently become artificially painful and dangerous. The thousand and one influences of man's intentional departure from Nature's methods of living on his bodily functions have produced physiological changes and perhaps have contributed to the appearance of many of the pathological processes of today. With childbirth, an exquisitely painful process, fraught with innumerable dangers to both mother and infant, it is little wonder that the average woman refuses to bear large families. The problem of procreation has in consequence become a serious one from the aspect of sociology. Moreover, this problem demands increasing attention since the death rate of infants and children among the so-called civilized races is high and the margin of safety, the extravagantly large margin provided by Nature, has nearly disappeared. The conditions vary in different countries. In Australia the margin is not so small as in France, but it is perilously small. Humanity cannot be altered by the passing of Acts of Parliament or by preaching. It is useless to plead for larger families, when men and women possess the knowledge of means to prevent conception and to interrupt pregnancy. The only practical remedy that remains, is care of the pregnant woman and her unborn infant.

The recommendations of the Royal Commissioners on Health in regard to "maternity hygiene" include the establishment of a division of "maternity hygiene" in the Commonwealth Department of Health, the subsidizing of the States by the Federal Government provided that those measures which are regarded as essential by the Commonwealth Department of Health, are adopted and the modification of the "Baby Bonus." In addition they recommend that financial assistance should be given to the Universities and training schools for nurses to enable these bodies to improve the method of education of medical students and nurses in obstetrics, provided that the conditions receive the approval of the Commonwealth Department of Health. It must be remembered that the Royal Commissioners were required to consider these matters in their relation to the Commonwealth Department of Health. On the other hand it is necessary to bear in mind that the whole subject has received a great impetus in the right direction, chiefly as a result of the energetic action of Dr. Dunbar Hooper and other prominent obstetricians. Many practical proposals have been made as a result of the campaign. The prize essay of Dr. E. Sydney Morris which has been published in this journal, contains a wealth of ideas and a workable plan of action. The several steps and stages have been discussed from time to time in our columns. Professor Windeyer is now completing his programme for the modern education of medical students in obstetrics; Dr. R. Marshall Allan is hard at work devising his systematic research in obstetrical problems needing further elucidation.

It is necessary at this stage to consider whether maternal hygiene, by which we mean the proper care of the pregnant woman and of the mother immediately after the birth of her baby, as well as of the baby, is a function of a health department or of the medical schools and the medical profession. Before the establishment of a division of "maternity hygiene" of the Commonwealth Department of Health receives the approval of the profession, it will be necessary to define its functions and the scope of its activity. It is questionable whether a health authority should assume the rôle of censor of the medical curriculum or of the methods adopted in the teaching of students and nurses. The amendment of the *Maternity Allowance Act* and the establishment of public maternity hospitals and prenatal clinics come well within the sphere of activity of the Commonwealth Department of Health. The proposals in connexion with these matters will probably receive the whole-hearted support of the medical profession. But we venture to suggest that careful consideration be given to the proposals concerning the teaching and practice of obstetrics before they are adopted. It seems probable that the movement already initiated in Melbourne, Sydney and Adelaide will raise the position of obstetrics in Australia to a high level.

Current Comment.

TUBERCULIN SKIN TESTS.

In 1898 Theobald Smith described the bacillus of bovine and that of human tuberculosis as separate and distinct types. When Robert Koch in 1901 made the pronouncement that human tuberculosis could not be transmitted to cattle and that bovine tuberculosis was not dangerous to man, much controversy arose around the subject. It is now generally conceded that the bacillus of bovine tuberculosis is capable of infecting man. Among the reasons for distinguishing the two types of bacilli was the reaction of rabbits to infection. Rabbits are highly susceptible to bovine tuberculosis, but not to the human type. It is agreed that considerable variation exists in the strains of both types of bacilli and that in some instances it is practically impossible to determine to which type an infection is due.

The question of the two types of tubercle bacilli have been discussed by several authors in regard to the cutaneous reaction bearing the name of von Pirquet. Recent additions to their number are Dr. H. F. Downing and Dr. H. L. Higgins.[1] They refer to the suggestion of Detre in 1908 that simultaneous tests should be made with human and bovine tuberculin in order that not only the presence or absence of tuberculosis but also the type of infecting organism might be determined. They also tabulate the results of nine sets of observations since 1908 in which bovine and human tuberculin were used with the von Pirquet test. They point out that in all the work that has been carried out along these lines, there have been many patients who reacted to only one type of tuberculin. Human tuberculin gave rise to more reactions than bovine tuberculin. The von Pirquet test has proved of great value in the diagnosis of tuberculous infection in children. The presence of a reaction signifies that the patient is either suffering from an active form of tuberculosis or has done so at some previous time. Dr. Downing and Dr. Higgins hold that failure to react may be due to the presence of an overwhelming tuberculous infection such as is seen in many cases of acute miliary tuberculosis and of tuberculous meningitis, it may be due to the presence of an intercurrent infection such as measles or influenza and in addition there are a certain number of patients who fail to yield a reaction, but do so on repetition of the test.

Dr. Downing and Dr. Higgins have carried out a series of routine tests with both types of tuberculin on children admitted to the Cincinnati General Hospital. Koch's old tuberculin was used for the human tuberculin test and bovine bouillon filtrate for the bovine test. The intracutaneous method was used, 0·1 milligramme of tuberculin or 0·1 cubic centimetre of a dilution of one in a thousand being employed. A control test was carried out with salt solution. Fifty-one tests were made. Three reactions were obtained to human tuberculin alone. Eight reactions occurred to bovine tuberculin alone. In six cases the reaction occurred to both types of tuberculin, but in a more intensive form to the human type. In fourteen reaction occurred to both types, but with greater intensity to the bovine type. In twenty the reaction to both types occurred with the same intensity. No mention is made as to which type of tuberculin was used first or whether both types were injected simultaneously. This is of importance in view of the smallness of the series and because of the fact previously mentioned that some patients fail to yield a reaction, but do so on repetition of the test. Two histories are given in full and in these cases human tuberculin was used twice without the production of a reaction. Subsequently a strong reaction occurred to bovine tuberculin and when human tuberculin was used later on only a slight response was obtained. These two cases are regarded as confirming the view that in the early stages of tuberculosis the patient will react to but one type of tuberculin and that this is presumably the infecting type; later on a group reaction is obtained to both types. The main con-

[1] *American Journal of Diseases of Children*, February, 1926.

clusion reached by Dr. Downing and Dr. Higgins is that both bovine and human tuberculin should be used in routine tests. They point out that had this not been done in their series, the diagnosis would have been missed in eight out of fifty-one cases.

ADRENALIN IN APNŒA NEONATORUM.

After the intravenous injection of even very small amounts of extract of the medulla of the suprarenal body, adrenalin, a distinct rise in blood pressure may be observed. When the rise is distinct, it is accompanied by a slowing of the pulse and this is the result of stimulation of the vagus centre. If the vagus nerves are cut or if they are paralysed by atropine, the same dose of adrenalin produces not a slowing but a quickening of the pulse. The vagus action of adrenalin is produced not because of the action of adrenalin on the vagus centre, but secondarily by the rise in the blood pressure. The site of action as far as the circulatory system is concerned is mainly the small blood vessels. The vaso-constricting action of adrenalin does not become manifest on the large blood vessels near the heart on account of the deficiency of muscular tissue in their walls. Adrenalin, however, does not act directly on the muscular tissue of the walls of the blood vessels. It has been found that it produces no action on tissues that are devoid of sympathetic nerve fibres. It is likewise inactive as far as tissues of the embryo which have not yet received any nerve supply, are concerned. The generalization may be made that adrenalin acts on all plain muscle and gland cells that are supplied with sympathetic nerve fibres and the result of the action is the same as would be produced by stimulation of these fibres. Yet curiously the action is not due to excitation of the sympathetic nerve fibres, for the action is even more pronounced when the nerve fibres have undergone degeneration. From this it has been concluded that the tissues elaborate some substance which reacts with adrenalin. This substance may be produced at the myo-neural junction or in the protoplasm itself. It has been called the receptor substance of Langley. It is believed to react with other drugs as well as adrenalin.

Adrenalin has been used clinically for very many purposes. Among the most spectacular of its recorded effects has been the renewal of heart's suspended action in a patient under the influence of anæsthesia after its injection directly into the chambers of the heart. It is well that attention should be directed again to the lethal effect of an injection of adrenalin on a person under chloroform anæsthesia. Professor Garipuy and Dr. Paul Mériel have recently reported its successful use as an intracardiac injection in the case of a newly-born baby suffering from apnœa.[1] Birth of the child had been complicated by prolapse of an arm and nipping of the cord between the arm and the head. On its birth the child was white, pulsation had ceased in the cord and no apex beat could be discovered. Mucus was aspirated from the respiratory passages by means of a tube and the usual attempts at artificial respiration were made together with rhythmical traction of the tongue. At the end of five minutes before cessation of these attempts an intracardiac injection of one cubic centimetre of a one in a thousand solution of adrenalin was given. As soon as the injection had been given the child took a breath and the heart's action became manifest. Movements of artificial respiration and the traction of the tongue were continued and at the end of fifteen minutes respiration had become established in a normal manner. For several hours afterwards acceleration of respiration and tachycardia were noted and these symptoms were followed by general vaso-dilatation of the whole integument. On the following day the child's condition was normal.

Professor Garipuy and Dr. Mériel describe the technique of the injection. A needle which is long and fine, must be used. It is inserted in the fifth intercostal space half-way between the middle line and the nipple line. There is no need to keep very close to the border of the sternum as in an adult to avoid the internal mammary vessels and the *cul de sac* of the pleura; the child has never breathed and the lungs are placed posteriorly against the vertebral column. The needle is pushed inwards at right angles and after the resistance of the myocardium has been felt, the blood flows backwards into the barrel of the syringe. The injection is then made. One or two points of importance are to be remembered. In the first place the delay between birth and the giving of the injection must not be too great. There is a limit to the time during which the tissues of the central nervous system can suffer the absence of "irrigation." This may be fixed at about ten or fifteen minutes. Lian in discussing intracardiac injections of adrenalin held that not more than six minutes should elapse between cessation of the heart's action and the giving of the injection. In the second place the movements of artificial respiration must be continued; adrenalin cannot take the place of these movements; it merely allows them to act.

[1] *La Presse Médicale*, February 10, 1926

THE AUSTRALASIAN MEDICAL CONGRESS.

The attention of members of the medical profession is directed to a notice issued by the Executive Committee of the second session of the Australasian Medical Congress (British Medical Association), Dunedin, 1927, which appears in the centre of this issue. Attached to this notice is the form of application for membership of Congress. It is essential that these forms should be sent to the Honorary General Secretary as early as possible. Members are advised to preserve the forms for later use if they are not able to enter their names immediately. Full instructions are given on the forms, while the names and addresses of the Honorary Local Secretaries in the several States of Australia will be found in the notice.

Abstracts from Current Medical Literature.

MORBID ANATOMY.

Thyreoid Gland Tissue in Dermoid Cyst of the Ovary.

Ernest H. Shaw (*The British Journal of Surgery*, January, 1926) describes an ovarian dermoid cyst. Macroscopical examination of the cyst after removal revealed that it was composed of several loculi, some containing thin fluid, while one near the base with a thicker wall contained a white thick oily material and hair characteristic of dermoids. On one side of the wall was a solid mass composed partly of cartilage, from its hardness apparently ossified in places, and some soft tissue not unlike that of thyreoid gland. Microscopical examination revealed a layer of skin, thrown into folds, with a large number of sebaceous glands. A few sweat glands were present in the underlying fat and a small area of calcification in one cofner. Then there was a layer of fibrous tissue beneath which was a large mass of thyreoid tissue. Most of the vesicles were large and filled with colloid material, some, however, were quite small and were also filled with colloid. There was evidence also of an old hæmorrhage in the thyreoid tissue.

Abnormally Located Goitres.

Frank H. Lahey (*Illinois Medical Journal*, January, 1926) discusses aberrant goitres. Embryologically the thyreoid gland is developed from the ventral aspect of the entoderm close by the ventral end of the first pharyngeal pouch caudal to the anterior portion of the rudimentary tongue. As development proceeds the gland passes through the tongue and takes up its final position in the neck. If any portion of this tract remains unclosed, the so-called thyreo-glossal cyst occurs. Clinically the production of myxœdema after removal of lingual goitre is opposed to the view that the thyreoid gland is developed from a lateral *Anlage*, for in this goitre all the existing thyreoid tissue is present. Certain lateral aberrant thyreoids occur occasionally in the supraclavicular space outside the sternomastoid muscle and these are caused by segments of the embryological thyreoid tissue becoming detached in development and remaining as rests until late in life. With the exception of these the remainder occur in the middle line and of first importance is the true lingual goitre. This consists of a mass in the median line on the posterior aspect of the tongue. It is dark red, lobulated and bleeds readily and may cause mechanical difficulties in swallowing. The intralingual goitre is similar except for the location and usually consists of solid masses of thyreoid tissue, although adenomata which could be shelled out, have been described. The true misplaced goitres are enlargements of the thyreoid itself which have acquired an unusual location. The types which are prone to acquire an unusual location, are the adenomatous goitre (most commonly single adenoma), colloid goitre and cystic goitre. Prolongations from any of these goitres, but especially from the colloid goitres, find their way into all sorts of unusual situations in the neck and thorax.

Rhabdomyoma of the Tongue.

Geoffrey Keynes (*The British Journal of Surgery*, January, 1926) describes a tumour which was diagnosed clinically as "fibroma of the median *raphé* of the tongue." Examination of the cut surface of the tissue removed revealed a rounded white area apparently continuous with the overlying epithelium and infiltrating the surrounding muscle. Microscopical examination showed that the epithelium was entirely unaffected, while the tumour cells formed a rounded mass of large irregularly disposed cells staining less intensely with eosin than the normal muscle cells. A few of the latter were present between the tumour cells without being in any way altered. There was no capsule and no sign of any inflammatory reaction was present. High power magnification revealed that the cells had no striation but very granular cytoplasm. Review of the scanty literature shows that the cells are often found in embryonal form without striation.

A Multinucleated Liver Cell Carcinoma.

Henry S. Rowden and F. B. Malloby (*American Journal of Pathology*, November, 1925) describe a multinucleated liver cell carcinoma. The microscopical structure consisted of an infiltrating tumour spreading everywhere through the smaller blood vessels and often distending them to a considerable degree. The neoplasm was composed of cells closely resembling normal liver cells, but distinctly larger in size. In certain areas the cells were arranged in columns with sinusoids and very little stroma. Occasionally groups of the cells contained small or large fat vacuoles, an appearance which suggested fatty infiltration. Generally the cytoplasm of the cells was basophilic and there was a lack of lobular arrangement and bile duct formation. Other areas contained tumour cells surrounding bile capillaries, many of which were distended with inspissated bile. The unusual feature was the presence of multinucleated cells of various shapes, the majority being very large and containing large numbers of nuclei which were usually separate, but sometimes fused together. A number of mitotic figures were seen, while there was fibrosis between the cell masses. Neither hæmosiderin nor hyaline could be found in any of the liver cells.

Liver Necrosis and Cirrhosis Produced Experimentally by Coal Tar.

James Davidson (*The Journal of Pathology and Bacteriology*, October, 1925) describes his experimental work on rabbits with coal tar. In these coal tar, the "*pix liquida*" of the hospital dispensary, was applied to the ears of the animals at intervals varying from a few days to a month. This caused the animals to lose weight and those receiving the coal tar the more often lost weight continuously. An ethereal solution of the coal tar given subcutaneously produced similar results. Histological examination of the livers removed revealed a different picture according to the susceptibility of the animal and the method of application. The more acute changes were of the nature of a coagulation necrosis of the liver cells and this was rather widely distributed. The liver cells adjacent to the necrotic areas were very hydropic and small round and polymorphonuclear cells were present in the affected areas. They were more numerous around the central veins. Those animals which were less affected, manifested subacute changes in the liver. The liver cells were swollen and the columnar arrangement often could not be made out. Certain of the cells were affected by hydropic vacuolation, while the nuclei of these cells manifested various stages and types of degeneration. The Kupffer cells were swollen and had conspicuous nuclei and it was difficult to distinguish them from the young fibroblasts of which there was a considerable proliferation. In certain areas the portal tracts were infiltrated by small round cells extending into the adjacent liver cells. In other animals again chronic changes were present. What is described as an interesting type of structure was observed. The new liver structure had the appearance of a tubular adenoma, the cells closely resembling normal liver cells in regard to their nucleus and cytoplasm. Their development could be traced from a mass of cells into a complete adenomatous tubule, in the lumen of which was a pale greenish-brown pigment. There was an increase of fibrous tissue, both young and old and the Kupffer cells were also swollen and in the portal tracts a distinct proliferation of bile ducts was seen. In some cases it appeared as if the liver cells had been formed by a proliferation of the cells of the bile duct at its termination. The author believes that coal tar acts on the liver cells and produces changes which are similar to the so-called acute, subacute and chronic "atrophies" of the human subject.

Epithelial Hyperplasia in the Breast.

George Lenthal Cheatle (*The British Journal of Surgery*, January, 1926) gives his opinion on epithelial hyperplasias of the breast. Firstly,

desquamative epithelial hyperplasia is discussed. In this lesion the acini and terminal ducts contain desiccated, irregularly shaped, ill-staining, cast-off epithelial cells. This type may remain for many years without alteration in the histological appearances. Secondly, a more common and important variety is one affecting the terminal ducts and acini. In this the epithelium undergoes hyperplasia and becomes elongated and feathery in appearance and only in the ducts do the desquamated epithelial cells appear like colostrum corpuscles. This type is specially a cause of duct and acinous cysts. Both these types are often accompanied by hyperplasia of connective tissue immediately surrounding the ducts and acini. The desquamatory epithelial hyperplasia may lead to an epithelial hyperplasia which is not desquamatory, but which gives rise to a pathological epithelial hyperplasia possibly ending in carcinoma. The appearances of the lesions in experimental skin tar carcinoma are compared with these. The importance is that this "dysgenetic" hyperplasia in the breast gives rise to a most suspicious looking collection of cells which are strictly confined within ducts and acini. They are to be considered as potentially malignant, for precisely similar appearances are encountered in the ducts and acini, where epithelial cells have escaped from their normal boundaries and constitute a state of carcinoma. He states that in the early stage of carcinoma there must be a time when this dysgenetic hyperplasia is confined within the ducts and acini. In the earliest carcinomata of the breast dysgenetic epithelial hyperplasia has been present in the acinus and also in the terminal duct and often this latter implication is of papillomatous nature. When Paget's disease affects the nipple, it is commonly complicated by the development of primary carcinoma in the ducts or terminal ducts and acini in the breast. The author maintains that there is a definite sequence of events, but any one of them may be absent and there may be interruption at any stage, the process becoming latent. Regression and degeneration may follow.

MORPHOLOGY

Blood Staining to Replace Injections.

H. A. Kull (*Anatomical Record*, November, 1925) describes a method of staining tissues to demonstrate the blood vessels. The method is useful to replace injections especially in embryological specimens. The sections are stained in carmine, rinsed in distilled water and treated with acid alcohol. They are then rinsed in distilled water and stained with indigo carmine. They are rinsed in distilled water and differentiated in saturated picric acid or picrofuchsin (Van Gieson) and the process is controlled by microscopical examination. They are treated with 95% alcohol and cleared and mounted in balsam in the usual way.

X Rays and Hereditary Abnormalities.

H. J. Bagg (*American Journal of Anatomy*, November, 1925) describes the results of a series of experiments on the effects of X rays in inducing abnormalities in the descendants of treated mice. A group of mice was subjected to a comparatively light dose of unfiltered X rays on five consecutive days. The descendants of these animals manifested abnormalities which chiefly affected the kidney and varied from a partial to a nearly complete atrophy of one kidney, to the congenital solitary kidney condition and to complete absence of both kidneys. The right and left kidneys were affected with equal frequency. Animals born with congenital absence of both kidneys were born alive and apparently normal, but died within twenty-four hours. Congenital hydronephrosis and polycystic kidneys are apparently associated with embryological factors that produce the suppression of kidney development. Blindness, syndactylism, polydactylism and club feet also occurred. Embryological studies showed that the defects were associated with blood extravasations, especially in the liver and testes. Apparently there is a tendency to disturbances generally in development. Selection greatly increased the number of animals with visceral abnormalities and it was found that the defects are definitely inherited, recessive to normal and approach the Mendelian expectation in behaviour.

A Peculiar Reflex Phenomenon.

P. M. Van Wulfften Palthe gives an account (*Brain*, Volume XLVIII., Part 4, 1926) of a complex reflex consisting of a feeling of suffocation and gasping for breath, accompanied by a curious sensation in the throat which occurs when a strong current of air strikes full in the face. He localized the receptive field in a sharply defined area of skin of the upper lip just under the two nostrils and nasal septum and discovered that the adequate stimulus is of a thermo-mechanical nature. He accurately describes the various components of the reflex and further discusses its biological, practical and clinical significance and suggests that it may have localization value in distinguishing between disorders in trigeminal sensibility of peripheral origin and those due to more centrally situated lesions above the linking centre of these cerebral nerves.

Musculature of Human Colon.

P. E. Lineback (*American Journal of Anatomy*, November, 1925) discusses the musculature of the human colon. He bases his conclusions on microscopical sections and micro-dissections of the colon at various stages of development. The longitudinal muscle of the colon developes as a continuous layer from the caudal end of the bowel—the mesenteric arc being in advance of the remainder. The tæniæ are later developed in this continuous layer. As a result of the interweaving of the two muscle layers at the tæniæ the latter serve as fixed cables or anchors against which segments of the circular muscle may pull and so form haustra and clefts. The vessels and nerves of the colon pass from their mesenteric origin to the bowel at regular intervals and practically all penetrate the wall on the mesenteric side of the lateral tæniæ. One group (the short terminals) pass into the wall at the line of the mesenteric tænia, the others (long terminals) pass to the lateral tæniæ *viâ* the interhaustral clefts and there form arches of anastomosis with adjacent vessels and then enter the wall. Their disposition in the clefts suggests that the clefts are permanent structures.

The Morphology of the Gasserian Ganglion.

Charles H. Frazier and Edward Whitehead (*Brain*, Volume XLVIII., Part 4, 1926) give an account of the development and structure of the Gasserian ganglion and a brief outline of their experiences with the radical operation for major trigeminal neuralgia. Their modifications, based on the researches described in the article, consists of the conservation of the motor root and the substitution of subtotal for total section of the sensory root of the ganglion. By saving the motor root the innervation of the muscles of mastication is conserved and the cosmetic result is improved by preventing temporal muscle atrophy and by the substitution of subtotal for total resection of the sensory root. In twenty-five selected cases it was observed that no keratitis occurred after the patient was discharged from hospital nor was there a single instance of recurrence of the pain in the three divisions of the trigeminal nerve.

Mitochondria of Spinal Ganglia Cells in Beri Beri.

Wenchao Ma (*American Journal of Anatomy*, November, 1925) states that the mitochondria in the spinal ganglion cells of chickens and pigeons manifest definite changes in beri beri, resulting in granulation, clumping or diffusion, weakening of the acidophilic reaction with change into lipoid and ultimate transformation to neutral fat. The Nissl bodies first disappear at the periphery of the cell and last in the vicinity of the nucleus. The normal association of lipoid material with mitochondria on the one hand and with Nissl substance on the other, suggests an intermediate position for the lipoid between the two substances. A graded series of observations suggests a derivative relation between mitochondria, lipoid and Nissl substance in that order and the nucleus probably exercises some control over the normal relations of these substances.

British Medical Association News.

SCIENTIFIC.

A meeting of the Western Australian Branch of the British Medical Association was held at the Perth Public Hospital on December 16, 1925, Dr. J. E. Ferguson Stewart, the President, in the chair.

Acute Nephritis.

Dr. W. H. Nelson showed a man, *ætatis* forty-seven years, who had suffered from acute nephritis. On the night of August 21, 1925 he had slept in a railway carriage with only a coat on him and awakened at midnight feeling cold and with a hacking cough. At 8 a.m. his face and eyes had been swollen and during the week he had noticed that he was passing less urine. Then his legs and testicles had began to swell and he saw Dr. Finkelstein at Kunnonoppin who treated him for nephritis. As he was not improving the doctor sent him into the Perth Hospital four weeks later. He had been admitted on September 27, 1925 œdematous in legs and scrotum, pale faced and with pouchy eyelids. He had been in the medical ward until November 9, 1925, during which time the amount of urine passed fluctuated, mainly on the low side. The amount of albumin passed and measured in Esbach's tube had steadily increased and was actually made greater on attempts being made to feed him. Even egg albumin water had a bad effect and the amount passed went as high as 1·1%. His kidneys had been examined by X rays, no calculus being seen. Microscopical examination had not revealed the presence of microorganisms. Granular and hyaline casts had been present (one in about four fields) and a few red blood corpuscles.

The blood urea on September 28, 1925 had been 75 milligrammes per one hundred cubic centimetres and on November 2, 1925, 35 milligrammes per one hundred cubic centimetres. The usual nephritic treatment had been instituted; large quantities of potassium citrate and infusion of digitalis had been given in a mixture, radiant baths and pilocarpine injections had been used, but all to no avail. He had steadily deteriorated had become more œdematous and the daily output of urine had fallen to one hundred and twenty cubic centimetres (four ounces). Dr. Nelson had decided that there was a chance if his kidneys were decapsulated, so a consultation had been held with his colleague, Mr. F. A. Hadley, who agreed and performed the operation on November 9, 1925. The capsules had been easily stripped and the kidneys had appeared large and deeply congested. The anæsthetic used was warm ether with oxygen. In the first twenty-four hours after the operation the patient had passed only one hundred and eighty cubic centimetres (six ounces) of urine, but since then he had passed over ten times that amount and the albumin had diminished to such an extent that at times there was no trace in the Esbach's tube and at other times up to 0·3%.

The man's general condition was excellent and the œdema was passing from his lower limbs and his thighs were quite normal. He had had no treatment whatever after the operation, so the improvement was undoubtedly solely due to the operation.

Previous to the illness this man's health had been excellent.

Dr. J. J. Holland asked if diuretin had been used and what was the indication that led to the operation.

Dr. Nelson replied that diuretin had not been used and that the indication for the operation was the complete failure of all recognized medical treatment in preventing the patient's downward course and he was sure that the operation could easily have been done a week earlier than was the case.

With regard to diuretin and the like Dr. Nelson recalled an interesting case which had occurred at the Melbourne Hospital when he was a student. A man, œdematous all over and passing very little urine, had been apparently near death when theocin sodium acetate had been given to him. The drug had just then made its appearance, Dr. Maudsley had ordered one gramme (fifteen grains) to be taken three times a day and in twenty-four hours the man had passed close on nine litres of urine and in place of a bloated body there had been an emaciated skeleton of a man.

Dr. D. M. McWhae, C.M.G., C.B.E., congratulated Dr. Nelson on the excellent result of the operation. He was at a loss to know when a patient should be submitted to operation; consequently this was a most instructive case.

Myelogenous Leuchæmia.

The next patient shown by Dr. Nelson was a woman, *ætatis* sixty-nine years, who had been admitted on October 20, 1925. She came of a long lived family and her mother had died at one hundred years of age. Some four years previously she had had severe epistaxis treated in the hospital for two weeks. About four months previously she had noticed a lump appearing under the left costal margin which was not painful. At the same time there was a generalized pruritus of body and since then the skin had become dry and withered. During the last few weeks the patient had felt tired and languid. There had been no vomiting and no nocturnal micturition. She thought she had lost weight, though her appetite remained good, but she was constipated. On examination the patient appeared to be in good health, had a good colour, but there was a moderate amount of petechial hæmorrhage in face and limbs. The tongue was furred, the heart's action moderately good with a few crepitations in the lungs. In the left hypochondrium the spleen could be felt to be enlarged, extending close to the umbilicus and extending downwards to the iliac crest. The splenic notch was easily felt. Microscopical examination of the blood on October 21, 1925, had yielded the following result: Leucocytes, 43,800 per cubic millimetre; neutrophile cells, 57%; eosinophile cells, 5%; basophile cells, 3%; myelocytes, 16%; lymphocytes, 19%; three nucleated reds had been seen and later normoblasts and one megaloblast. The film was that of myelogenous leuchæmia. On October 29, 1925, Dr. Thompson examined the eyes, but could find no leuchæmic retinitis. She had been given large doses of *liquor arsenicalis* and was taking 0·6 cubic centimetre (ten minims) three times a day. Two applications of X rays had been made and the result had been excellent; the spleen had shrunk and could almost be pouched in the hand. The blood picture was: Red blood corpuscles, 7,800,000 per cubic millimetre; leucocytes, 6,900 per cubic millimetre. The film seemed normal and no pathological cells were seen. Owing to the heavy drop in the leucocytes no further application of X rays could be made, particularly as it was considered unsafe to bring the leucocytes lower than 20,000.

Dr. Nelson was convinced that the improvement was due to the radiological treatment.

A second patient suffering from myelogenous leuchæmia was then shown by Dr. Nelson. The patient was a single woman, *ætatis* thirty-five years, who had been admitted on November 5, 1925. About two years previously she began to be "queer" mentally and had gradually got worse. The abdomen had gradually increased in size and more so in the previous two weeks.

On examining her the spleen had been found to be very large, going half way across the opposite side of the abdomen.

The blood count had been as follows: Red blood cells, 3,600,000 per cubic millimetre; hæmoglobin value, 65%; colour index, 1; leucocytes, 669,600 per cubic millimetre; myelocytes, 75%; polymorphonuclear cells 13%; eosinophile cells, 4%; basophile cells, 6%; lymphocytes, 2%.

Some megaloblasts had been seen. A diagnosis of myelogenous leuchæmia had been made.

Owing to the mental condition X ray application had been avoided, arsenic had been used for a while, but now she was taking benzol in doses of 0·3 gramme (five minims). She had not improved.

A blood count taken on November 11, 1925 yielded the following result: Red blood cells, 4,410,000 and leucocytes,

820,000 per cubic millimetre. Nucleated red cells had been seen in about every fifth field. No megaloblasts were present.

ANNUAL MEETING.

THE ANNUAL MEETING OF THE TASMANIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Museum, Hobart, on February 26, 1926, DR. J. RAMSAY, C.B.E., the President, in the chair.

ANNUAL REPORT OF COUNCIL.

The Annual Report of the Council was presented by the Honorary Secretary and was received.

Annual Report.

During the past year the membership has increased from 74 to 86, the increase being mainly due to the rejoining of several unfinancial members.

Thirteen meetings of the Branch were held, with an average attendance of 14·3, a slight increase over last year's attendances. The Council held fifteen meetings with an average attendance of 5·6.

More interest was shown during the year in the clinical meetings and lectures. Drs. Stansfield, Sweetnam (2) and Fay read papers which were much appreciated by members and several members presented clinical cases and notes thereon.

Due to Dr. Rogers's persuasion, Dr. Royle while on a vacation in Hobart delivered a most interesting and instructive lecture on his recent work. It was most clearly illustrated by cinematograph films which was made possible by the courtesy of Mr. E. Webster and the Kodak Company.

Unfortunately the Government rescinded the authority given us to secure material for dissection purposes at the close of last year and it has only been by persistent pressure by the subcommittee, greatly aided by Professor Berry, that this month we have again secured that authority. The subcommittee are now obtaining estimates for the fitting up of a dissecting room, museum *et cetera* at the University.

A conference was held with the Child Welfare Association with the object of bringing about closer cooperation between the medical profession and the Child Welfare Association. A mothercraft home was opened by the Child Welfare Association during the year to which Dr. Sprent and Dr. Giblin were appointed Honorary Physician and Surgeon respectively and Drs. Sandford-Morgan and Shugg Honorary Medical Officers.

Dr. Barr represented the Tasmanian Branch at the opening of the British Medical Association's new home in Tavistock Square. He presented on our behalf a gavel suitably inscribed.

Negotiations were entered upon with the Chief Secretary and the Hobart Hospital Board with the object of re-establishing an honorary staff at the General Hospital. The attempt proved abortive.

Dr. Sweetnam was nominated and elected to represent the medical practitioners of Hobart on the Hospital Board.

Everything is now ready for the formation of two divisions. By-laws for the divisions have been drafted and approved by the Council and the Branch.

ELECTION OF OFFICE-BEARERS.

The President announced the result of the election of office-bearers and members of the Council.

President: Dr. E. Brettingham Moore.
Vice-President: Dr. G. E. Clemons.
President Elect: Dr. G. H. Hogg.
Members of the Council: Dr. F. W. Fay, M.C., Dr. H. Sweetnam, Dr. T. C. Butler, Dr. L. Gollan, Dr. J. Ramsay, C.B.E.
Honorary Treasurer: Dr. E. A. Rogers.
Honorary Secretary: Dr. A. W. Shugg.

FINANCIAL STATEMENT.

The Honorary Treasurer submitted the balance sheet and moved its reception. The motion was carried.

BRITISH MEDICAL ASSOCIATION—TASMANIAN BRANCH.

RECEIPTS AND EXPENDITURE FOR YEAR ENDED DECEMBER 31, 1925.

RECEIPTS.	£	s.	d.
Balance at Hobart Savings Bank, January 1, 1924	228	4	7
Members' Subscriptions	336	6	3
Hobart Savings Bank, Interest	6	0	4
Interest on Debenture, Australasian Medical Publishing Company, Limited	7	10	0
	£578	1	2

PAYMENTS.	£	s.	d.
Remittances to London	125	17	2
Subscriptions to THE MEDICAL JOURNAL OF AUSTRALIA	47	0	0
Printing, Stationery, Stamps and Petty Expenses	37	0	3
Federal Committee Expenses	7	18	0
Legal Expenses	3	3	0
English, Scottish and Australian Bank, Fixed Deposit	300	0	0
Attendant of Room	3	0	0
Balance at Bank	54	2	9
	£578	1	2

E. A. ROGERS,
Honorary Treasurer.

C. A. BENNETTO, A.I.C.A.,
Auditor.

MEDICO-POLITICAL.

A SPECIAL MEETING OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held on March 25, 1926, at the B.M.A. Building, 30-34, Elizabeth Street, Sydney, DR. R. J. MILLARD, C.M.G., C.B.E., the President, in the chair.

The Medical Benevolent Fund of New South Wales.

DR. J. MACDONALD GILL presented the report of the Medical Benevolent Fund of New South Wales for the year 1925-1926.

Annual Report of the Trustees.

The Committee have pleasure in submitting the Annual Report to the subscribers for the year 1925-1926. The income has been £213 12s. 0d.; the expenditure £177 3s. 6d. and the total sum in hand £661 13s. 6d.

The administration of the Fund does not call for any special comment, except that every case coming before the Committee is carefully investigated. There is no doubt that a great deal more money is required before the Fund can adequately meet the legitimate demands which come before it. With a view to strengthening the position of the Fund the Committtee have had a new set of rules prepared. These rules have been printed and are

available for distribution among subscribers. The new rules provide for a change of name, *videlicet* The Medical Benevolent Association of New South Wales. Members pay one guinea annually and become life members on paying fifteen yearly subscriptions or if they prefer it, may become life members on paying ten guineas in one sum. These rules have been based on those of similar associations already in existence of solicitors and barristers. If the meeting adopts them, seven councillors and two auditors have to be elected. The Council is to consist of three Trustees, a Secretary, a Treasurer and two councillors. Trustees hold office for three years and the other councillors for one year.

Dr. J. Macdonald Gill pointed out that the organization of the fund had not been quite as sound as it might have been. The Trustees had therefore resolved to form an association. They had considered the question of constitution and after consultation with their solicitors and with Dr. Todd they had approved of a set of new rules which had been printed and distributed among the members present. He moved that the report of the Fund be received.

The motion was seconded by Dr. E. S. Littlejohn and carried.

Dr. E. S. Littlejohn moved the adoption of the statement of accounts of the New South Wales Medical Benevolent Fund. The motion was adopted.

The Medical Benevolent Association of New South Wales.

Dr. Gill then moved that a body to be called The Medical Benevolent Association of New South Wales be formed. This was seconded by Dr. Littlejohn and carried.

It was resolved that the money in hand of the Fund be handed over to the Trustees of the new Association.

Dr. Gill moved the adoption of the rules.

Rules.

1. The Association shall be called "The Medical Benevolent Association of New South Wales" and shall consist of duly qualified medical practitioners registered in New South Wales.

2. The objects of the Association shall be to relieve either by donations or annuities necessitous members and their wives and families or any member thereof and the necessitous widows and families of deceased members or any member thereof and in special cases the parents of deceased members or either or any of them and necessitous persons who are or have been medical practitioners but have not been members and who in the opinion of the Council may be deserving of relief and their wives and families or any member thereof and the necessitous widows and families of deceased medical practitioners who have been members of the Association or any members thereof but who were not members of the Association at the time of their decease.

3. Any legally qualified medical practitioner registered in New South Wales desirous of becoming a member of the Association may on application to the Secretary have his name in full qualifications and address inserted in the candidate's book. The names of such candidates shall be submitted for approval to the Council. A majority of the votes shall be necessary to decide the election or otherwise of the candidates.

4. The Secretary shall send notice of election to every new member within seven days of such election and shall enter his name and address in the register of members of the Association.

5. Each new member shall within twenty-one days of his election pay the sum of One Pound one shilling (£1 1s.) being his subscription for the current year and shall thereby be bound by the Rules of the Association.

6. Subscribers shall have the option of becoming life or annual members. A payment in one sum of Ten pounds ten shillings (£10 10s.) on admission or at any time thereafter shall constitute a life member and an annual subscription of One pound one shilling (£1 1s.) in advance an annual member. An annual member shall become a life member when his total subscriptions shall amount to Fifteen pounds fifteen shillings (£15 15s.). Provided that the balance of subscription may be paid up at any time.

7. The annual subscription shall be due and payable in advance on the first day of January. Should any member neglect to forward his subscription to the Treasurer before the first day of April he shall cease to be a member of the Association unless reasonable cause for such delay shall be shown in writing to the Council, whose decision in the matter shall be final.

8. The Association shall be under the management of a Council of seven to be constituted as follows: Three Trustees a Secretary a Treasurer and two Councillors who shall be elected at the annual meeting. The Trustees shall hold office for three years and the other members of the Council and the Auditors shall hold office for one year. All office-bearers shall be eligible for re-election without nomination previous to the meeting at which they are re-elected. All acts done by any member of the Council or other officer of the Association or by a committee of the Council or by any person acting as a member of the Council shall notwithstanding that it shall afterwards be

NEW SOUTH WALES MEDICAL BENEVOLENT FUND.

Statement of Accounts to December 31, 1925.

Receipts.	£	s.	d.	£	s.	d.
By Balance brought forward				625	5	0
„ Donations from Societies—						
Central Southern Medical Association	£5	0	0			
Northern District Medical Association	10	10	0			
Western Medical Association	5	0	0			
Illawarra Suburbs Medical Association	10	10	0			
				31	0	0
„ Subscriptions				148	0	0
„ Interest, Government Savings Bank				34	12	0
				£838	17	0

Expenditure.	£	s.	d.	£	s.	d.
To Assistance to Various Beneficiaries				175	0	0
„ Bank Charges, Exchanges and Stamps				2	3	6
„ Balance—						
Government Savings Bank	£610	3	3			
Commercial Bank	41	0	3			
Cash in hand	10	10	0			
				661	13	6
				£838	17	0

F. Hemsworth,
Auditor.

Sydney March 24, 1926.

E. S. Littlejohn,
Hon. Treasurer.

discovered that there was some defect in the appointment of such member of the Council or other officer of the Association or person acting as aforesaid or that they or any of them were disqualified be as valid as if every such person had been duly appointed and was qualified to be a member of the Council or such officer as aforesaid.

9. Subject as aforesaid nomination to the various offices in the Council shall be made in writing and signed by at least two members and shall be sent to the Secretary at least fourteen days before the day fixed for the annual meeting.

10. The annual meeting shall be held in the month of March or April at such time and place as shall be fixed by the Council. Fourteen days' notice of the annual meeting and of all other meetings shall be given to members.

11. The Council shall make a report of the proceedings of the Association and present at the annual general meeting a balance-sheet showing the state of the funds and a financial statement covering the operations for the preceding year together with a list of members of the Association.

12. At the annual general meeting there shall be appointed two Auditors to audit the accounts.

13. The Council shall have power to:

(*a*) Elect its Chairman and Deputy Chairman.

(*b*) Direct how the election of officers shall be conducted and the manner in which when and where the votes on any motion shall be taken and in particular whether proxy voting is to be allowed.

(*c*) Admit members.

(*d*) Engage offices.

(*e*) Make orders and regulations for the management of the Association.

(*f*) Direct special general meetings of the Association.

(*g*) Direct the investment of and control and distribute the funds decide finally on all applications for relief and the amount and mode of affording it and whether by donation annuity or otherwise according to the circumstances of the case and the persons to be relieved and generally to conduct the business of the Association.

(*h*) Determine any doubt which may arise as to the interpretation of these Rules. Such decision to be final.

(*i*) Fill up any casual vacancies on the Council or in the office of auditor. All those appointed under this rule shall hold office for the unexpired portion of the term for which the persons retiring had been elected.

(*j*) Appoint subcommittees of not less than three of its number for the election of members or for any special purpose.

(*k*) Promote the formation of local committeees to aid them in the investigation of applications for relief and for other purposes connected with the administration of the affairs of the Association.

(*l*) Cause the Association to be incorporated at any time it thinks fit.

14. Three members shall be necessary to form a quorum at Council meetings and twelve members shall be necessary to form a quorum at a meeting of the members of the Association. The ordinary meetings of the Council shall be held in Sydney.

15. The uninvested funds of the Association shall be kept in the name of the Association in a bank to be selected by the Council. Such moneys may be placed on fixed deposit with any of the principal banks in Sydney or may be invested in the Government securities or the usual trustees' investments. All sums received on account of the Association shall be paid into the bank in the name of the Association and all cheques on the bank shall be drawn by order of the Council and signed by one of the Trustees and countersigned by the Treasurer. The Treasurer shall keep the accounts and perform all other duties usually allotted to the office of Treasurer.

16. A notice may be served upon any member by sending it through the post in a prepaid letter addressed to such member at his last address as appearing in the register of members of the Association.

17. The Rules of the Association may from time to time be rescinded or altered and new Rules be made at any special general meeting consisting of not less than twelve members by the vote of not less than three-fourths of the members present but notice of any intended motion for such recission alteration or new Rules must be given to the Secretary twenty-eight days before the day fixed for the meeting and must be given to all the members with the notices convening the meeting.

18. Any member whose name shall be removed from the New South Wales Register of Medical Practitioners shall cease to be a member of the Association and the register of members shall be amended accordingly.

19. If any Trustee shall file a petition for the liquidation of his affairs or make a declaration of insolvency or be adjudged bankrupt or make an assignment for the benefit of his creditors he shall thereupon cease to be a Trustee and shall not be eligible for re-election as a Trustee until he shall have obtained his certificate or a release from his creditors.

20. Whenever a Trustee shall die resign his office refuse to act or become incapable of acting or be removed from office or shall cease to be a member of the Association he shall cease to hold office and the vacancy thereby created shall be filled up in accordance with the Rules within a period of three months.

The motion was seconded by Dr. Ralph Worrall and was carried.

Election of Trustees and Office Bearers.

The following were elected the Trustees and Office Bearers of the Medical Benevolent Association of New South Wales:

Trustees: Dr. Thomas H. Fiaschi, D.S.O., V.D., Dr. R. L. Faithfull, Dr. F. W. Hall.
Honorary Secretary: Dr. J. Macdonald Gill.
Honorary Treasurer: Dr. E. S. Littlejohn.
Members of Council: Dr. A. W. Campbell, Dr. A. A. Palmer.
Honorary Auditors: Dr. Hamilton Marshall, Dr. John MacPherson.

Dr. E. S. Littlejohn, the Honorary Treasurer of the Medical Benevolent Fund of New South Wales, has handed to us the following statement:

The former Medical Benevolent Fund of New South Wales which has been in existence since 1896, has now become The Medical Benevolent Association of New South Wales and has widened its scope in a very important manner. The Association while still maintaining its benevolent function in regard to any deserving necessitous member of the profession, whether he be a member of the Association or not, has now become also in effect an insurance society, aiming at providing insurance for its members and their dependents against, at any rate, actual want and distress due to misfortune, prolonged illness or accident. Hence a necessitous member of the Association including his dependents being compelled to apply for assistance, will be able to do so feeling that they are in no sense appealing for charity, but that he has a perfect right to ask for the benefits of the Association of which he is a contributing member, just as he would in the case of any ordinary insurance society. This is obviously a very important point which should appeal to all.

The New South Wales Medical Union, as you know, insures its members against blackmail and financial loss arising out of action at law. The Union which was initiated in 1893, is now firmly established on a sound financial basis and provides its members with all necessary legal advice and assistance and perfectly adequate insurance against financial loss in actions at law. The Union has reached this very satisfactory position in comparatively few years with the low annual subscription of one guinea and there is no reason why the Benevolent Association should not attain an equal success and in a few years be in a position to afford adequate assistance to its members in case of

misfortune, provided it receives reasonable support. Surely this Association should appeal to every member of the profession and should appeal to the other successful members in its benevolent aspect and it should appeal very strongly to the young men just entering practice.

Misfortune often arrives suddenly and unexpectedly and the young practitioner is frequently not in a position to insure himself at all adequately in the ordinary insurance societies owing to the high annual premium that has to be paid. Here is an association which for the small annual payment of one guinea will protect him and his dependents from want and distress in case of misfortune befalling him and will provide clothing and education and all assistance necessary. Further this Association will put an end to the necessity for those occasional distressing appeals to charity of which we have experience, appeals which are most humiliating to the unfortunate dependents.

Fifteen annual payments of one guinea or one payment of ten guineas entitle the subscriber to life membership.

I appeal confidently to the profession to support this Association and I make a special appeal for fifty life members to come forward and help the Association forward on the road to success.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been nominated for election as members of the New South Wales Branch of the British Medical Association:

Broughton, John Walter, M.B., Ch.M., 1924 (Univ. Sydney), Murdoch Street, Cremorne.

Dearberg, John Louis, L.R.C.P., L.R.C.S. (Edinburgh), 1926, L.R.F.P. et S. (Glasgow), 1926, 133, Oberon Street, Coogee.

Hay, Vivian Charles Langtree, M.B., Ch.M., 1925 (Univ. Sydney), Kirribilli Avenue, Kirribilli.

Special Abstract.

DENTAL DISEASE IN CHILDREN.

THE MEDICAL RESEARCH COUNCIL OF THE PRIVY COUNCIL has published a report of an investigation into the incidence of dental disease in children.[1] The investigation was carried out by a Committee appointed in 1921. It consisted of the following members: Dr. Norman G. Bennett, Dr. Leonard Colebrook, Dr. W. H. Dolamore, Sir Arthur Keith, F.R.S., Mr. P. P. Laidlaw, Mrs. M. Mellanby, Mr. J. Howard Mummery and Dr. C. J. Thomas with Dr. H. C. T. Langdon as Secretary.

In the introduction the members of the Committee point out that a statistical investigation was undertaken in 1921 with a view to discovering the prevalence of dental caries, diseases of the gum and other buccal defects and abnormalities. Examinations made by school medical officers and dental officers have shown that dental caries is exceedingly prevalent among children of school age. The results have not been of great value for scientific purposes for several reasons. The inspections were made by a large number of different persons whose estimate of the existence and extent of caries was divergent. Moreover, the object of most of the inspections was to afford an indication or basis for treatment, hence they were useful only for clinical purposes and not from an ætiological standpoint. The Committee therefore decided that the collection of fresh data was necessary. They formulated several questions and have discussed these under the various headings of the report. Children at all school ages were examined, but examination was limited to those who had never received any conservative dental treatment. An exception to this rule was made in the case of one school. In view of the fact that the employment of a number of investigators might render difficult the satisfactory comparison of results, it was decided to entrust the inquiry to Dr. N. J. Ainsworth who holds both medical and dental qualifications.

The number of children examined in the course of the investigation was 4,258. Of these 2,163 were boys and 2,095 were girls. Their ages varied from two to fifteen years. The selection of schools at which examinations were carried out, was made with a view to securing the widest variety in regard to geographical, physical and inaustrial condition. Preference was given to schools whose children for various reasons had not received dental treatment. The children examined were chosen as far as possible in the order in which their names appeared on the alphabetical register. Selection was made in such a way that approximately the same number of children were chosen for each age period between six and thirteen. In the table dealing with the children and the number of schools examined the character of the water supply in each area is given. The water supplied to 2,361 children was hard, that supplied to 799 was medium and the water for 1,098 was soft.

The only reliable values that could be calculated from the data for the teeth that were seen in the different stages of eruption, were the ages at which children were found with half the teeth of any type (i.) partially erupted (ii.) fully erupted. A full table in which these ages are stated is given for each sex. Both sexes are taken together and the ages at which 50% of the several types of teeth were partially erupted and the order of eruption based on those ages are stated. Thus lower first molars were present at 6·1 years, upper first molars at 6.2 years, lower central incisors at 6·4 years, upper central incisors at 7.3 years, lower lateral incisors at 7·6 years, upper lateral incisors at 8·6 years, upper first premolar at 9·9 years, lower canines at 10·4 years, lower first premolars at 10·6 years, upper second premolars at 10·8 years, lower second premolars and upper canines at 11·5 years, lower second molars at 11·7 years and upper second molars at 12·2 years. From this table and from the other previously referred to it may be seen that the dates of eruption of the teeth in the lower jaw are earlier than those of the corresponding teeth of the upper jaw in all types except the first and second premolars. The age at which the several types of teeth were found in the stages of eruption considered was usually lower in girls than boys. It is claimed that the dates of eruption for the different types of teeth correspond fairly closely to those determined by James and Pitts in England and by Röse in Germany. The time required for completion of eruption was obtained by determining the differences between the ages at which 50% of each type were found present in any stage of eruption and the age at which they were fully erupted. Thus the time required for completion of eruption of upper first incisors and upper second incisors was 1·3 years, for lower first incisors the time was 1·2 years, for lower second incisors and lower canines 1·1 years, for upper canines 1 year, for upper and lower first premolars 0·9 years, for upper and lower second molars 0·7 year, for lower first molars and lower second premolars 0·6 year and for upper first molars and upper second premolars 0·5 year. A tooth was regarded as fully erupted when it was in occlusion with the opposing teeth or when it was in alignment with other teeth in occlusion with their opponents.

The incidence of caries in particular teeth is in a measure influenced by the condition of the deciduous teeth. For example the distal surface of the first permanent molar hardly ever becomes carious until after the eruption of the second permanent molar at the age of twelve. On the other hand the mesial surface frequently becomes carious early if the distal surface of the second deciduous molar is carious, but if the latter tooth is sound or had been treated, the mesial surface of the permanent tooth rarely becomes carious until some time after the eruption of the second premolar at the age of ten or eleven. It is pointed out that although it was important to obtain records of the incidence of caries in deciduous teeth, difficulty was experienced owing to the fact that between

[1] Medical Research Council of the Privy Council, Special Report Series, Number 97, "The Incidence of Dental Disease in Children."

the ages of seven and twelve the deciduous teeth are shed by natural process. In regard to deciduous teeth it was found that sex differences were unimportant. Temporary molars manifested the highest incidence of caries, the incidence was slightly higher in second than in first molars. The central incisors came next in frequency of carious involvement and then came the lateral incisors and the canines. The percentage of involvement in the latter was distinctly lower than that of other types. Of the various surfaces of the deciduous teeth the mesial and distal surfaces were most frequently affected with one exception. In the second molar teeth the occlusal surface was most frequently the seat of trouble.

In the upper central incisors caries most frequently affects the mesial surface. The lower incidence on the distal surface is due to the late eruption of the lateral incisors which are destined to make contact with it. The mesial surface was involved in 62% of carious central incisors and the distal surface in 48%. In children at the age of ten which is three years after 50% of upper central incisors are erupted, the total amount of caries is approximately 3%. At twelve years of age the incidence has increased to 5·5% and at thirteen it has reached 9%.

The upper lateral incisors are affected in a percentage similar to the centrals. The mesial surface is the commonest site and the lingual pit is often involved, the distal surface is rarely affected presumably owing to the late eruption of the canines. The mesial, lingual and distal surfaces of carious teeth are affected respectively in 83%, 16% and 4%. In children at eleven years of age, that is, three years after 50% of the upper lateral incisors have erupted, the number of carious teeth of this description is 3%. In children two years older the percentage exceeds seven.

The lower incisors are relatively free from caries. Thirteen instances were found in an examination of 6,314 lower central incisors and the same number in 5,343 laterals.

The canine teeth are also relatively free from caries. Nine cases were found among 2,144 teeth in the upper jaw and two cases only among 3,094 in the lower.

The incidence of caries in the upper first premolars is about double that of the incisors. The occlusal and distal surfaces are about equally affected, the mesial much less frequently. The late eruption of the canine is probably responsible for the last named fact. A contributory factor may be its closer contact with the second deciduous molar than with the deciduous canine when these teeth persist. The percentage of caries on the occlusal, distal and mesial surfaces was respectively 49, 52 and 16. In children aged eleven years, that is one and a half years after the age at which 50% of upper first premolars have made their appearance, the total proportion of carious teeth is nearly 4%. In children two years older the percentage has increased to 10·4.

In the upper second premolars, though the total percentage of caries is somewhat higher than in the first premolars, the occlusal surface is relatively less frequently affected. Possibly the later eruption of the second premolar is sufficient to account for this. In 241 teeth with caries the occlusal and distal surfaces were each involved in 45% and the mesial surface in 36%. In children of eleven years of age, that is fully six months later than the age at which 50% of upper second premolars are erupted, the total proportion of caries is 5·6%. In children two years older the amount of caries exceeds 13%.

Of the two lower premolars the second is nearly three times more commonly found carious than the first. The surfaces are attacked with a somewhat similar relative frequency in the two teeth except that buccal caries is not uncommon in the first lower premolars, but rare in the second. This buccal caries occurs in teeth affected by local hyperplasia.

In children at the age of seven which is one and a half years after the age at which 50% of upper first molars are erupted, the proportion of caries is 18%. In children at the age of nine 33% of these teeth are carious and at thirteen the proportion has reached 52%.

At the age of seven which is about one and a half years after the age at which 50% of lower first molars are erupted, the total percentage of carious teeth of this description is 28·5. In children two years older the percentage has increased to 45. At the age of thirteen the percentage of decay is 61·5.

In the upper second molars practically all the caries is in the early stage and is almost confined to the fissures of the occlusal surface. Caries which is apparently lingual, is really the result of extension on to the lingual surface of one of the occlusal fissures. In children at the age of thirteen which is nearly one and a half years after the age at which 50% of upper second molars are erupted, the total caries is 16·5%. At the age of fourteen the percentage has increased to 23·5.

Caries in lower second molars is nearly twice as frequent as in the corresponding teeth in the upper jaw.

As in the first molars caries of the buccal pit plays a part in causing this difference. At the age of twelve years which is about a year after the age at which 50% of lower second molars are erupted, the proportion of carious teeth is approximately 28%. In children two years older the total percentage of caries in these teeth has increased to 44.

Arrested caries was found in only forty among 6,753 permanent teeth. Arrest of caries is more than six times as common in deciduous as in permanent teeth. In permanent teeth it is recorded only in molars and premolars. Occlusal cavities are by far the most common site for its occurrence and in most instances the caries is of the third degree of severity. This implies a considerable loss of enamel from the occlusal surface. These facts point to accessibility of the cavity as an important factor in the arrest of caries. It was noticeable that when arrested caries occurred mesially or distally in deciduous teeth, it was nearly always associated with wide spacing due to the growth of bone; this occasioned greatly increased accessibility. Another point bearing on the greater frequency of arrested caries in deciduous than in permanent teeth is the rapid wearing down of the occlusal surface of the former. This tends to make cavities shallower and to smooth off overhanging edges of enamel.

An attempt was made to investigate the incidence of caries as it occurred in schools in different parts of the country. It was found that caries was more frequent in town than in country schools. The question of hard and soft water supply was also investigated. It was not found possible to ascribe any ætiological significance to the character of the water.

In regard to hypoplasia reference is made to the findings of Mrs. Mellanby who undertook the microscopical examination of two hundred and two deciduous teeth in 1923. She found that whereas only 3% were badly formed, 84·5% were structurally defective. For this reason it is pointed out that the gross types of hypoplasia to which it was found necessary to limit the investigation, form only a small percentage of defectively formed teeth. The figures therefore give no real indication of the frequency with which structural defects occur. In the permanent teeth five types of hypoplasia were recognized: A syphilitic type, an infantile type, a febrile type, a general type and a local type. In syphilitic hypoplasia the markings are characteristic. In hypoplasia of infancy approximately the lower thirds of the crowns of the permanent maxillary central incisors and corresponding portions of other permanent teeth calcified at the same time (during the first year of life) are affected. In hypoplasia of infectious fevers or other severe illnesses horizontal lines appear on the parts of the teeth calcified during the period of the illness. General hypoplasia is characterized by defective enamel formation throughout the mouth and local hypoplasia is usually confined to a premolar tooth. Of the permanent teeth actually present infantile hypoplasia was found in 2·3%, the febrile form in 0·6% and the local in 0·4%. It was found that a definitely increased susceptibility to caries was present in the hypoplasic teeth, caries of such teeth occurs in the hypoplasic area and thus the increase in caries appears to be directly attributable to the hypoplasia.

In regard to the presence of gingivitis it is pointed out that the slightest lapse from the typical firmness and paleness of perfect health was recorded as slight gingivitis. About a third of all the children examined fell into this

class. In probably one-half of these the slight inflammation affected all buccal gingivæ in both jaws and seemed obviously due to persistent neglect to clean the teeth. In most of the remaining children the condition was limited to the anterior upper teeth and was frequently associated with a history of enlarged tonsils and adenoids. In a small number the lower incisor region was alone affected and the condition was apparently due to the presence of yellow tartar. The term severe gingivitis was restricted to those cases in which hyperæmia and swelling of the gingival margins were present together with a tendency to bleed freely on being touched with a probe. On examination of the tables on which the results of the examination for gingivitis are drawn up, it is seen that the condition increases in frequency and in severity with an increase in age. Stress is laid on the fact that less than 50% of the children in the age groups thirteen and fourteen have healthy gums. It was found impossible to correlate the incidence of gingivitis with other conditions of the mouth which might predispose to it.

The question of malocclusion was investigated. It is pointed out that there are two factors in development which may throw some light upon abnormal developments of the dental arches and abnormal occlusion of the teeth of the two arches. In the first place the size of the arches has apparently become reduced in comparatively recent times at a greater rate than that of the teeth themselves. Secondly, together with reduction in the size of the arches there seems to be a tendency towards a more frequent occlusion of the mandible arch with the maxillary in a position posterior to what is regarded as normal. The change from an edge to edge bite of the incisors to one in which the lower incisors close behind the other incisors seems to be comparatively recent. It is regarded as not unreasonable to suppose that a further change in the same direction is in progress. The criterion of normal occlusion throughout the work was the relative position of the opposing first permanent molars with the anterior buccal cusp of the upper lying in the groove between the two buccal cusps of the lower molar. Antero-posterior malocclusion, either unilateral or bilateral, was found in varying degrees in 23% of all the children examined.

As previously mentioned all the investigations in connexion with this report were made in schools whose children had undergone no conservative dental treatment. An exception was made in the case of a school in Cambridge and a note is added at the end of the report in regard to observations made at this place. In this school conservative treatment had been systematically carried out with a thoroughness not attempted in any other school. Filled teeth at this school were regarded as sound. As a result the percentage of carious teeth was considerably less, but no light was shed on the question as to whether systematic treatment has any value in preventing caries. It seemed impossible to devise any method that would show the effects of treatment except the comparison of the percentages of permanent teeth rendered functionless by or extracted on account of advanced caries in the different schools. The teeth so affected are usually the first permanent molars and it is held to be reasonable to suppose that any saving of the teeth is due either to treatment of the neighbouring deciduous teeth in earlier years or to the filling of commencing cavities. It was found that the incidence of teeth rendered functionless or extracted for caries was 2% in the Cambridge school among children over eight and a half years of age and that in the remaining schools it varied from 13% to 60% with an average of approximately 30% for the whole group taken together.

Congress Notes.

AUSTRALASIAN MEDICAL CONGRESS (BRITISH MEDICAL ASSOCIATION).

The following information has been supplied to us for publication by the Executive Committee of the Australasian Medical Congress (British Medical Association), Dunedin, 1927.

General Arrangements.

There will be four full working days during the session, Thursday, February 3, Friday, February 4, Monday, February 7 and Tuesday, February 8, 1927. On each day before the meetings of the sections there will be demonstrations in the hospitals and similar arrangements. The morning meetings will commence at 9.45 and terminate at 12.45; the afternoon meetings will commence at 2.15 and terminate at 4.15.

The sections are twelve in number.

Section I.—Medicine.
Section II.—Surgery.
Section III.—Obstetrics and Gynæcology.
Section IV.—Pathology and Bacteriology.
Section V.—Preventive Medicine.
Section VI.—Ophthalmology.
Section VII.—Otology and Rhinology.
Section VIII.—Neurology.
Section IX.—Pædiatrics.
Section X.—Naval and Military Medicine and Surgery.
Section XI.—Orthopædics.
Section XII.—Radiology.

Sectional Office Bearers.

Each section will have a president elected from among the members of one of the Branches of the British Medical Association in Australia and several vice-presidents elected from among the members of the Branches in Australia and New Zealand. There will also be a local committee and a secretary for each section in Dunedin.

Meetings.

In addition to the ordinary meetings of individual sections, there will be combined meetings of several sections.

The combined meetings will be as follows:

Thursday, February 3, 1927.

Morning Session.—Discussion on goitre; Section I., Medicine; Section II., Surgery; Section IV., Pathology and Bacteriology; Section V., Preventive Medicine; Section XII., Radiology.

Monday, February 7, 1927.

Morning Session.—Discussion on the prevention of disease in infancy and childhood; Section III., Obstetrics and Gynæcology; Section V., Preventive Medicine; Section IX., Pædiatrics.

Afternoon Session.—Discussion on parasitology; hydatid tests of clinical interest (for first forty minutes); Section II., Surgery; Section IV., Pathology and Bacteriology; Section V., Preventive Medicine. Hookworm in Australia and Samoa (short papers). Discussion on the cripple in war and peace; Section X., Naval and Military Medicine and Surgery; Section XI., Orthopædics.

Tuesday, February 8, 1927.

9.45 to 11.30.—Discussion on spastic paraplegia; Section I., Medicine; Section II., Surgery; Section VIII., Neurology; Section XI., Orthopædics.

11.0.—Discussion on cancer; an outline of the present position; all sections.

The Sectional meetings will be as follows:

Section I.—Medicine.

Thursday, February 3.—Afternoon Session: Goitre (papers considered in detail).

Friday, February 4.—Diet as a cause of disease; diet in the treatment of disease.

Section II.—Surgery.

Thursday, February 3.—Afternoon Session: Goitre treatment (papers considered in detail).

Friday, February 4.—Surgery of the alimentary tract; modern advances in urology.

Monday, February 7.—Blood diseases; surgery of diseases of the blood; intravenous therapy and blood transfusion; surgery of the liver and gall bladder.

Tuesday, February 8.—New work; inflammations and tumours of bone.

Section III.—Obstetrics and Gynæcology.

Thursday, February 3.—Afternoon Session: Discussion on prolapse.

Friday, February 4.—Discussion on the problems of Cæsarean section; papers.

Tuesday, February 8.—X ray and radium treatment in gynæcology (probably with Section XII., Radiology).

Section IV.—Pathology and Bacteriology.

Thursday, February 3.—Afternoon Session: Goitre (short papers in detail).

Friday, February 4.—Diet in relation to disease; strains of tubercle bacilli in Australasia; poliomyelitis.

Monday, February 7.—Serum reactions, Wassermann and Kahn tests, fixation of tubercle bacilli, gonococci and other bacteria. In afternoon short papers of hookworm and on tropical conditions.

Tuesday, February 8.—Inflammations and tumours of bone (probably with Section II., Surgery and Section XII., Radiology).

Section V.—Preventive Medicine.

Thursday, February 3.—Afternoon Session: Details of goitre incidence, preventive measures and results.

Friday, Februray 4.—Milk supply problems; food preservatives; deficiency diseases.

Tuesday, February 8.—Child welfare; industrial hygiene.

Section VI.—Ophthalmology.

President's address and discussion on the cause of concomitant strabismus; corneal opacities; treatment of the lachrymal apparatus.

This section will met only in the mornings.

Section VII.—Otology and Rhinology.

Discussion on oto-neurology and the diagnosis of intracranial diseases; eye diseases and disturbance of vision caused by nose and sinus affection.

This section will meet only in the afternoons.

Section VIII.—Neurology.

Thursday, February 3.—Internal glandular disturbance in mental disorder; discussion on sepsis in relation to mental disorder.

Friday, February 4.—Discussion on education of mental defectives and vocational training; discussion on delinquency; treatment of general paralysis of the insane and locomotor ataxy; dementia præcox.

Monday, February 7.—Discussion on the voluntary patient and the value of the scheme.

Tuesday, February 8.—Infantile paralysis.

Section IX.—Pædiatrics.

Thursday, February 3.—Afternoon Session: President's address on infant feeding and baby welfare.

Friday, February 4.—Pulmonary tuberculosis in infants and children; infant feeding.

Monday, February 7.—Modern advances in treatment; introduction of blood and other fluids; serum treatment in pneumonia. (Possibly a visit to Karitane Hospital).

Tuesday, February 8.—Discussion on summer diarrhœa; deficiency diseases; light treatment; cœliac disease.

Section X.—Naval and Military Medicine and Surgery.

Various papers on medical work in the field with special reference to the battle of Messines; protection of the civil population during air raids. Staff rides will be held.

Section XI.—Orthopædics.

(Papers yet to be arranged).

Section XII.—Radiology.

Thursday, February 3.—Afternoon Session: Goitre; pituitary disease and other endocrine disturbances of radiological interest.

Friday, February 4.—Morning Session: Radiology of the alimentary tract. Afternoon Session: Urinary tract (these meetings may be held together with the meetings of Section II.).

Monday, February 7.—Morning Session: Blood diseases or diathermy. Afternoon Session: Diagnosis of hydatids and other parasitic affections. (This section may attend the combined meeting during the first forty minutes of the afternoon session).

Tuesday, February 8.—Afternoon Session: Diseases of bone (together with Sections II. and IV.).

Correspondence.

BOILS.

SIR: I have read with interest the correspondence in THE MEDICAL JOURNAL OF AUSTRALIA on the subject of boils, following Dr. G. G. Bradley's letter dated January 4.

Some methods advised are simple and others elaborate, but I do not think that any one of them is satisfactory in securing certainty of cure.

But for many years I have practised a simple form of treatment which has never failed in cases of boils in an early stage of development.

The method is simply to introduce with the point of a hypodermic needle one minim of pure liquid carbolic acid into the apex of the swelling just deeply enough for the needle opening to be buried beneath the skin. Beyond a slight stinging sensation on injection there is no pain. The patient immediately has a sense of comfort and the boil there and then aborts, leaving a slight painless induration at its site.

The patient should be told to present himself immediately he finds signs of the development of a boil in any new area, whereupon the treatment is repeated.

I have in this way rapidly brought to an end a furuncular process which has been progressing for many months and it has rarely been necessary to make more than two injections.

Yours, etc.,

FRED. W. HALL.

235, Macquarie Street, Sydney,
April 13, 1926.

University Intelligence.

THE UNIVERSITY OF SYDNEY.

A MEETING of the Senate of the University of Sydney was held on April 12, 1926.

It was decided to concur in the proposals of the War Office, London, with regard to the antedate to University candidates who were given commissions in the Regular Army.

Professors Kenner, Stewart and Harrison were appointed delegates to represent the University at the Conference of the Australasian Association for the Advancement of Science to be held at Perth, Western Australia, in August next.

Regarding the Diploma course in Journalism, it was decided to nominate a Committee consisting of the Vice-Chancellor, the Dean of the Faculty of Arts, and Professors R. C. Mills and F. A. Todd to cooperate with the Institute of Journalists, the Australian Journalists' Association and representatives, proprietors, or general managers of the daily newspapers, with a view to bringing matters of special concern forward for settlement.

The Institute of Journalists submitted a list of names of students selected for scholarships made available by newspaper proprietaries and the Institute of Journalists in connexion with the Diploma Course in Journalism.

The Vice-Chancellor was nominated to represent the University as a member of an expert committee which will

report upon the provision of education of a University standard at Canberra.

The Chief Justice, the Honourable Philip Street, was unanimously elected to the position of Deputy Chancellor for the year 1926-1927.

NOTICE.

THE May meeting of the Queensland Branch of the British Medical Association will be held at the Commonwealth Laboratory Building, Toowoomba, on May 1, 1926, at 8.15 p.m. A paper will be read, a lantern demonstration will be given and specimens will be shown. All members are cordially invited to be present. Further information may be obtained from the Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.

Medical Appointments.

Dr. Charles Norman Atkins (B.M.A.) has been appointed Acting Medical Inspector of Seamen at the port of Hobart, Tasmania.

* * * *

Dr. Valentine Charles Podger (B.M.A.) has been appointed Certifying Medical Practitioner at Cranbourne, Victoria.

* * * *

Dr. Peter Lalor has been appointed Acting Medical Superintendent of the Hospital for the Insane at Sunbury, Victoria.

Books Received.

PRACTICAL MICROSCOPY: AN INTRODUCTION TO MICROSCOPICAL METHODS, by F. Shillington Scales, M.A., M.D., B.Ch. (Cantab.); Third Edition; 1926. London: Baillière, Tindall and Cox. Crown 8vo., pp. 342, with illustrations. Price: 8s. 6d. net.

THE B.D.H. BOOK OF A. R. STANDARDS. Issued by The British Drug Houses, Limited, London. Crown 8vo., pp. 111. Price: 1s. 6d. net.

MODERN VIEWS ON DIGESTION AND GASTRIC DISEASE, by Hugh Maclean, M.D., D.Sc., M.R.C.P.; 1925. London: Constable and Company, Limited. Sydney: Angus and Robertson, Limited. Demy 8vo., pp. 170, with illustrations. Price: 14s. 6d. net.

MODERN METHODS OF FEEDING IN INFANCY AND CHILDHOOD, by Donald Paterson, B.A., M.B. (Edinburgh), M.R.C.P. (London), and J. Forest Smith, M.R.C.P. (London); Modern Medical Monographs, Edited by Hugh Maclean, M.D., D.Sc.; 1926. London: Constable and Company, Limited. Sydney: Angus and Robertson, Limited. Demy 8vo., pp. 106. Price: 9s. net.

CATECHISM SERIES: VENEREAL DISEASES, by Charles Averill, M.A., B.Sc., M.D., D.P.H.; 1926. Edinburgh: E. and S. Livingstone. Crown 8vo., pp. 88. Price: 1s. 6d. net.

SURGERY OF CHILDHOOD, by John Fraser, M.C., M.D., Ch.M., F.R.C.S.E.; in two Volumes; 1926. London: Edward Arnold and Company. Royal 8vo., pp. 1152, with illustrations. Price: 42s. net, two volumes.

AN ELEMENTARY COURSE IN TROPICAL HYGIENE, by Mary G. Blacklock, M.B., B.Sc., D.T.M.; Preface by Andrew Balfour, C.B., C.M.G., M.D., B.Sc., F.R.C.P.; Part II. 1926. London: John Bale, Sons and Danielsson, Limited. Crown 8vo., pp. 108, with illustrations. Price: 2s. 6d. net.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xxvi.

ADELAIDE CHILDREN'S HOSPITAL (INCORPORATED): Honorary Ophthalmologist.

AUSTIN HOSPITAL FOR INCURABLE AND CHRONIC DISEASES, HEIDELBERG, VICTORIA: Honorary Surgeon.

PERTH HOSPITAL, WESTERN AUSTRALIA: Chief Resident Medical Officer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchester United Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association.
QUEENSLAND: Honorary Secretary B.M.A. Building, Adelaide Street, Brisbane.	Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Honorary Secretary, 12, North Terrace, Adelaide.	Contract Practice Appointments at Ceduna, Wudinna (Central Eyre's Peninsula), Murat Bay and other West Coast of South Australia Districts.
WESTERN AUSTRALIAN: Honorary Secretary, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Diary for the Month.

APR. 27.—New South Wales Branch, B.M.A.: Medical Politics Committee.
APR. 28.—Victorian Branch, B.M.A.: Council.
APR. 29.—New South Wales Branch, B.M.A.: Branch (Ordinary)
APR. 29.—South Australian Branch, B.M.A.: Branch.
MAY 4.—Tasmanian Branch, B.M.A.: Council.
MAY 5.—Victorian Branch, B.M.A.: Branch.
MAY 5.—Western Australian Branch, B.M.A.: Council.
MAY 6.—South Australian Branch, B.M.A.: Council.
MAY 7.—Queensland Branch, B.M.A.: Branch.
MAY 8.—New South Wales Branch, B.M.A.: Ethics Committee.
MAY 11.—Tasmanian Branch, B.M.A.: Branch.
MAY 13.—Victorian Branch, B.M.A.: Council.
MAY 13.—New South Wales Branch, B.M.A.: Clinical Meeting.
MAY 14.—Queensland Branch, B.M.A.: Council.
MAY 17.—New South Wales Branch, B.M.A.: Organization and Science Committee.
MAY 18.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
MAY 18.—Tasmanian Branch, B.M.A.: Council.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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